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GC-MS ANALYSIS, ANTIOXIDANT, ANTIMICROBIAL CYTOTOXICITY, ACTIVITIES OF LEAVES ESSENTIAL OIL *OCIMUM BASILICUM* AND *OCIMUM GRATISSIMUM* L. (LAMIACEAE)

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ABSTRACT

Ocimum basilicum L. (basil) belonging to the plant family Lamiaceae, and the genus sensuality, comprises 65 species (Paton & Harley, 1999). Basil leaves containing essential oils of distinctive aroma can be used both fresh and dried to spice up various kinds of meals (Grayer *et al*., 2004).And *Ocimum gratissimum* L. (Family Lamiaceae) commonly called basil, is a culinary herb with pungent sweet smell. Propagation of basil is through seeds and also reliably from cuttings, the foliage is commonly used fresh in cooked recipes or added at the last moment, as cooking quickly destroys the flavor (Onajobi 1986). The present study was conducted to investigate the antimicrobial, antioxidant, most active of Cytotoxicity activity. Essential oil of *O. basilicum* leaves showed different peaks nineteen Compounds indentified. The Compounds with high percentage area were Eugenol (54.78%), Caryophyllene (15.93%), Cyclohexane, 1-ethenyl-1-methyl-2-(1-methylethenyl)-4-(1-methylethylidene) -(7.47%). Essential oil of *O. gratissimum* leaves showed different peaks forty six Compounds indentified. The Compounds with high percentage area were Benzene, 1,2-dimethoxy-4-(1-propenyl)-(53.51%), Bicyclo[4.4.0] dec-1-ene, 2-isopropyl**(**4.12%), Eugenol (7.26%).

KEYWORDS: GC-MS Analysis, Antioxidant, Antimicrobial Cytotoxicity.

I. INTRODUCTION

Aromatic plants contain odorous, volatile, hydrophobic and highly concentrated compounds called essential oils (or volatile or ethereal oils). These are obtained from various parts of the plant such as flowers, buds, seeds, leaves, twigs, bark, wood, fruits and roots (Brenes and Roura, 2010; Negi, 2012). The essential oils are complex agriculture mixtures of secondary metabolites consisting of low-boiling-point phenylpropenes and terpenes (Greathead, 2003). The oils are usually extracted by steam distillation, while currently the use of supercritical carbon dioxide extraction has become increasingly popular (Lubbe and Verpoorte, 2011). Depending on type and concentration, essential oils exhibit cytotoxic effects on living cells, although non-genotoxic. The cytotoxic activity of essential oils is mostly due to the presence of phenols, aldehydes and alcohols (Sacchetti *et al*., 2005). Such cytotoxic activity is of great interest for applications against some human or animal pathogens and parasites, as well as for the preservation of agricultural and marine products (Bakkali *et al*., 2008).

II. MATERIALS AND METHODS

Plant materials: Plant samples were collected from its natural habitat from Algadarif area (East of Sudan), by Mr. Yahia Suliman taxonomically identified and authenticated by Dr. Haidar Abdelgadir at the Herbarium of Medicinal and Aromatic Plants and Traditional Medicine Research Institute (MAPTMRI) where the voucher specimen has been deposited for future work.

Method of extraction of essential oils

The oil from each of the tested plants *Ocimum basilicum* and *Ocimum gratissimum* was obtained by Hydro distillation technique using Clevenger's apparatus. Hundred grams from each of the tested plant materials were placed in two liters round bottom flask, distilled water was added, and volatile oil has been distilled. The crude volatile oil of each plant was transferred by means of a pipette into a separate brown glass bottle. Anhydrous sodium sulphate was added agitated gently to absorb the water and the clear oil was decanted into brown glass bottle and kept in the refrigerator until needed for analysis.

III. RESULTS

Table (1): Yield percentages of essential oil of leaves *O. basilicum and O. gratissimum.*

Samples	Weight of Sample (g)	Weight of extract (g)	Yield (%)
O. basilicum	100	2.7	2.70
O.gratissimum	100	4.4	2.93

It's clearly seen from table (1) that the yield percentage of essential oil These results with different ranges of yields percentages, may be due to the presence the of different secondary metabolites present in each extract tested.

Table (2): Antimicrobial activity of essential oil of leaves *O. basilicum and O. gratissimum* against standard microorganisms.

Plants Samples	Standard tested organisms* /M.D.I.Z (mm)**					
	B. s	***S. a***	***E. c***	***Ps.* a**	***A. n***	***C. a***
O. basilicum	17	20	21	18	20	21
O. gratissimum	20	22	17	15	17	20

***Standard organisms tested:** *B.s. = Bacillus subtilis, S.a. =Staphylococcus aureus, E.c. = Escherichia coli, Ps.a. = Pseudomonas aeruginosa, A.n= Aspergillus niger, C.a= Candida albicans.*

Table (3): Antioxidant results of *O. basilicum and O. gratissimum.*

No.	Plants Sample	%RSA ±SD (DPPH)
1	*O. basilicum*	64± 0·15
2	*O. gratissimum*	79± 0·11
3	PG (STD)	88 ± 0·04

Key: PG = Propyl gallate **EDTA=** Ethylene diaminetetraacetic acid**.**

Table (4): Result of (Brine shrimp) lethality of *O. basilicum and O.gratissimum* by Finney probity Analysis (Model).

No.	Plants Sample	LD_{50}	Result
1	*O. basilicum*	2056.735	Non Toxic
2	*O.gratissimum*	1646.0573	Non Toxic

Key: ≤ 249: highly toxic; 250 – 499: Moderate; 500 - 1000: non-toxic.

Table (5): GC/MS analysis of essential oil of O. *basilicum:*

Peak No.	Compound	Retention Time (RT)	Area %	Formula
1	Cyclohexane,1-ethenyl-1-methyl-2,4-(1-methylethylidene)	12.250	7.47	C15H24
2	Caryophyllene	12.917	15.93	$C_{15}H_{24}$
3	Hexadecane	13.175	2.03	$C_{16}H_{34}$
4	Alpha-Caryophyllene	13.683	1.25	C15H24
5	Eugenol	13.975	54.78	$C_{10}H_{12}O_2$
6	Eudesma-4(14),11-diene	14.325	2.59	$C_{15}H_{24}$
7	Naphthalene, 1,2,3,4,4a,5,6,8a-octahydro-4a,8-dimethyl-2-(1-methylethenyl)-, [2R-(2α,4aα,8aβ)]	14.433	2.45	$C_{15}H_{24}$
8	Eicosane	14.683	1.22	$C_{20}H_{42}$
9	Pentadecane,4-methyl-	14.842	1.06	$C_{16}H_{34}$
10	Benzene,1,2-dimethoxy-4-(2-propeny)	14.967	1.07	$C_{11}H_{14}O_2$
11	Tetradecane,4-methyl-	15.592	1.02	$C_{15}H_{32}$
12	Pentanoic acid, 2,2,4-trimethyl-3-carboxyisopropyl, isobutyl ester	15.700	0.69	C16H30O4
13	Caryophyllene oxide	16.800	1.04	$C_{15}H_{24}O$
14	Dodecane,2-methyl-	16.875	1.40	$C_{13}H_{28}$
15	Tetracontane	17.983	0.62	$C_{40}H_{82}$
16	Selina-6-en-4-ol	18.100	1.70	$C_{15}H_{26}O$
17	Tridecane,6-propyl-	18.358	0.67	C20 H42
18	Cyclohexadecane	19.867	1.91	$C_{16}H_{32}$
19	7,9-Di-tert-butyl-1-oxaspiro(4,5)deca	24.242	0.73	$C_{17}H_{24}O_3$

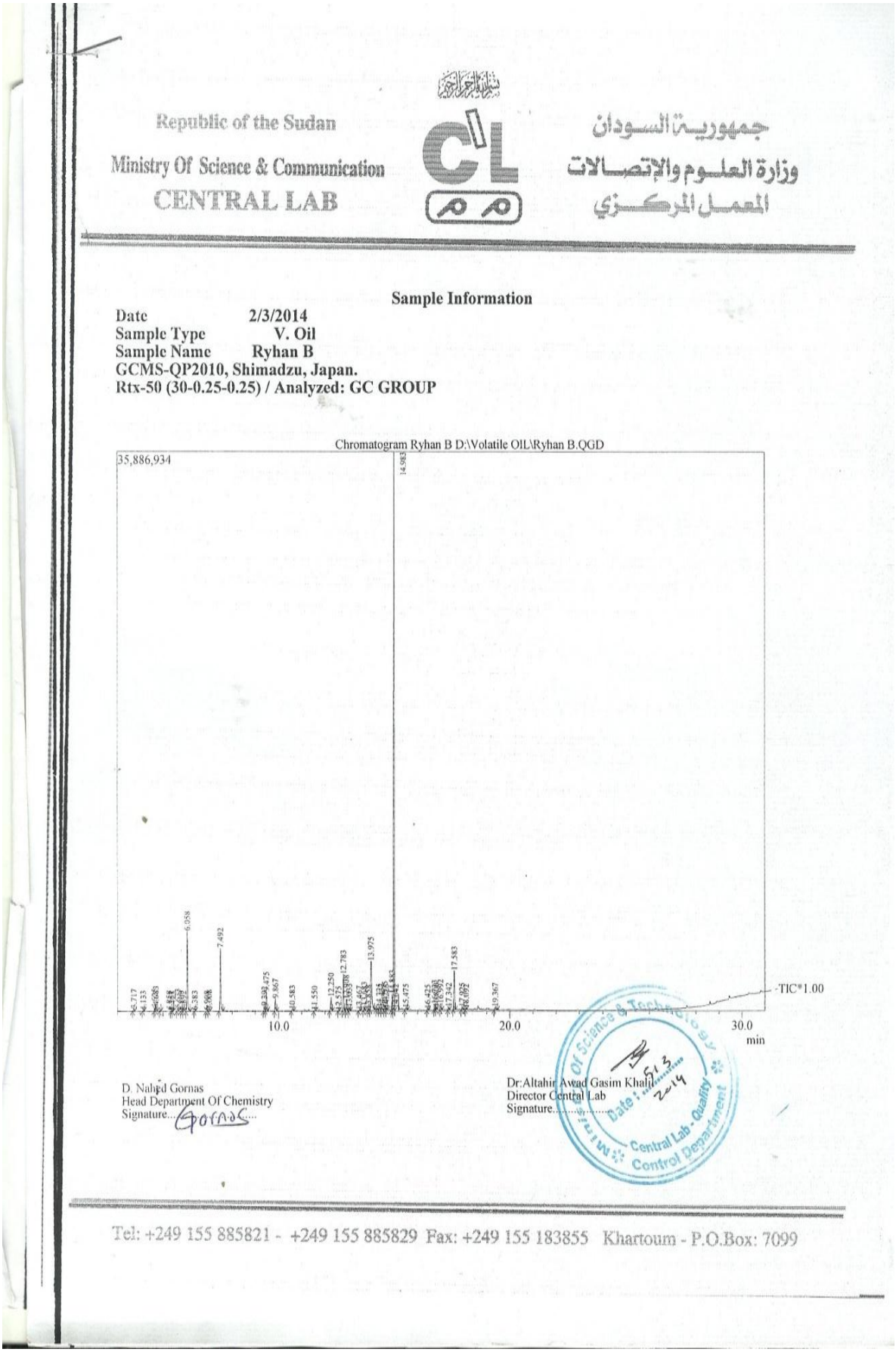
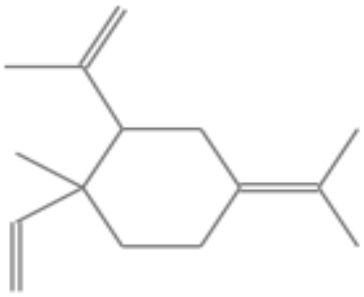
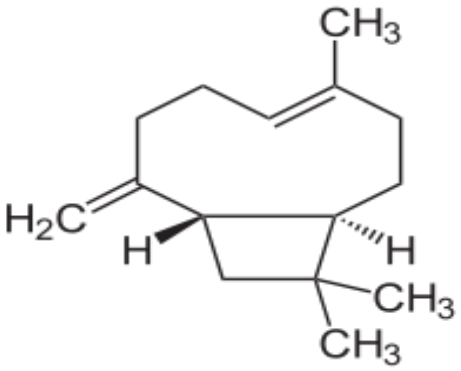


Figure (1): Representative structures of some identified compounds of essential oil of *O. basilicum*.

Cyclohexane, 1-ethenyl-1-methyl-2-(1-methylethenyl) -4-(1-methylethylidene)-



Caryophyllene



Eugenol

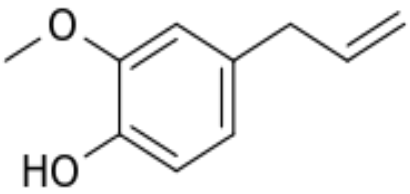


Table (6): GC/MS analysis of *O. gratissimum* Essential oil.

Peak NO	Name	Retention Time (RT)e	Area %	Formula
1	(IR)-2,6,6-Trimethylbicyclo [3.1.1] hept-2-ene	3.717	0.27	$C_{10}H_{16}$
2	Camphene	4.133	0.06	$C_{10}H_{16}$
3	Bicyclo [3.1.0]hexane,4-methylene -1	4.625	0.16	$C_{10}H_{16}$
4	.beta.-pinene	4.683	0.47	$C_{10}H_{16}$
5	.beta.-Myrcene	4.858	0.07	$C_{10}H_{16}$
6	6,6-Dimethylhepta-2,4-diene	5.367	0.03	C_9H_{16}
7	Cyclohexene,3-methyl-6-(1-methyletl	5.425	0.02	$C_{10}H_{18}$
8	D-Limonnene	5.633	0.26	$C_{10}H_{16}$
9	.beta.-Phellandrene	5.800	0.02	$C_{10}H_{16}$
10	(IS)-2,6,6-Trimethylbicyclo [3.1.1] hep	5.892	0.04	$C_{10}H_{16}$
11	Eucalyptol	6.058	0.86	$C_{10}H_{18}O$
12	1,4-Cyclohexadiene,1-methyl1-4(1-m)	6.383	0,06	$C_{10}H_{16}$
13	Bicyclo[3.1.0]hexan-2-ol,2-methyl-5-m	6.908	0.06	$C_{10}H_{18}O$
14	2-Furanmethanol,5-ethenyltetrahydro	7.008	0.21	$C_{10}H_{18}O_2$
15	1,6-Octadien-3-ol,3,7-dimethyl-	7.492	2.74	$C_{10}H_{18}$
16	3Cyclohexene-1-ol,4-methyl-1-(1-m)	9.392	0.53	$C_{10}H_{18}O$
17	Biocyclo[2.2.1]heptan-2-one,1,7,7-trim	9.475	2.09	$C_{10}H_{16}O$
18	3-Cyclohexen -1-methanol, .alpha.,.	9.867	1.40	C10H18O
19	Anisole,p-allyl-	10.583	0.28	$C_{10}H_{12}O$
20	2Cyclohexen-1-one,2-methyl-5-(1-m)	11.550	0.10	$C_{10}H_{16}O$
21	Cyclohexane,1-ethenyl-1-methyl-2 ,4-	12.250	01.43	$C_{15}H_{24}$
22	1,3,6,10-Dodecatetraene,3,7,11-trimethyl	12.575	0.04	$C_{15}H_{24}$
23	Biocyclo[3.1.1] hept-2-ene,2,6-dimethy	12.783	3.47	$C_{15}H_{24}$
24	Biocyclo[7.2.0]undec-4-ene,4,11,11,-tri	12.908	1.20	$C_{15}H_{24}$
25	Azulene,1,2,3,4,5,6,7,8,-octahydro-1,4	13.033	0.35	$C_{15}H_{24}$
26	Alpha.-Cubebene	13.467	0.08	$C_{15}H_{24}$
27	1,4,7,-Cycloundecadiene,1,5,9,9-tetra	13.683	0.48	$C_{16}H_{28}N_4O_8$
28	(+)-Epi-bicyclosesquiphellandrene	13.858	0.13	$C_{15}H_{24}$
29	Eugenol	13.975	7.26	$C_{10}H_{12}O_2$
30	1,6 Cyclodecadiene,1-methyl-5-meth	14.225	0.17	$C_{15}H_{24}$

31	Biocyclo[5.3.0]decane,2-methylene-5-	14.325	0.33	$C_{16}H_{30}$
32	Eudesma-4(14),7(11)-dien-8-one	14.433	0.34	C15H22O
33	1,4-Methano-1H-indene,octahydro	14.575	0.45	$C_{15}H_{24}$
34	Gamma.-Gurjunenepoxide-(1)	14.642	0.19	$C_{15}H_{24}O$
35	Naphthalene, 1,2,3,4,4a,5,6,8a-octahydro-4a,	14.883	1.60	$C_{15}H_{24}$
36	Benzene, 1,2-dimethoxy-4-(1-propenyl)-	14.983	53.51	$C_{11}H_{14}O_2$
37	Ethanone,1-(1,3a,4,5,6,7-hexahydro-4	15.475	0.35	$C_{15}H_{26}O$
38	Gamma.-Gurjunenepoxide-(1)	16.425	0.14	$C_{15}H_{24}O$
39	1H-Cycloprop[e]azulen-7-ol, decahydro-1	16.733	0.63	$C_{15}H_{24}O$
40	Caryophyllene oxide	16.800	0.22	$C_{15}H_{24}O$
41	Cubenol	16.992	0.64	$C_{15}H_{26}O$
42	12-Oxabicyclo[9.1.0] dodeca -3,7-diene	17.342	0.31	C15H24O
43	Bicyclo[4.4.0]dec-1-ene,2-isopropyl	17.583	4.12	$C_{15}H_{24}$
44	Ledol	17.925	0.29	$C_{15}H_{26}O$
45	(-)-Globulol	18.092	0.09	$C_{15}H_{26}O$
46	2R,6s2,6,8,8Tetramethyltricyclo[5.2.2.0(4,6)]undecan-3-one	19.367	0.47	C15H24O

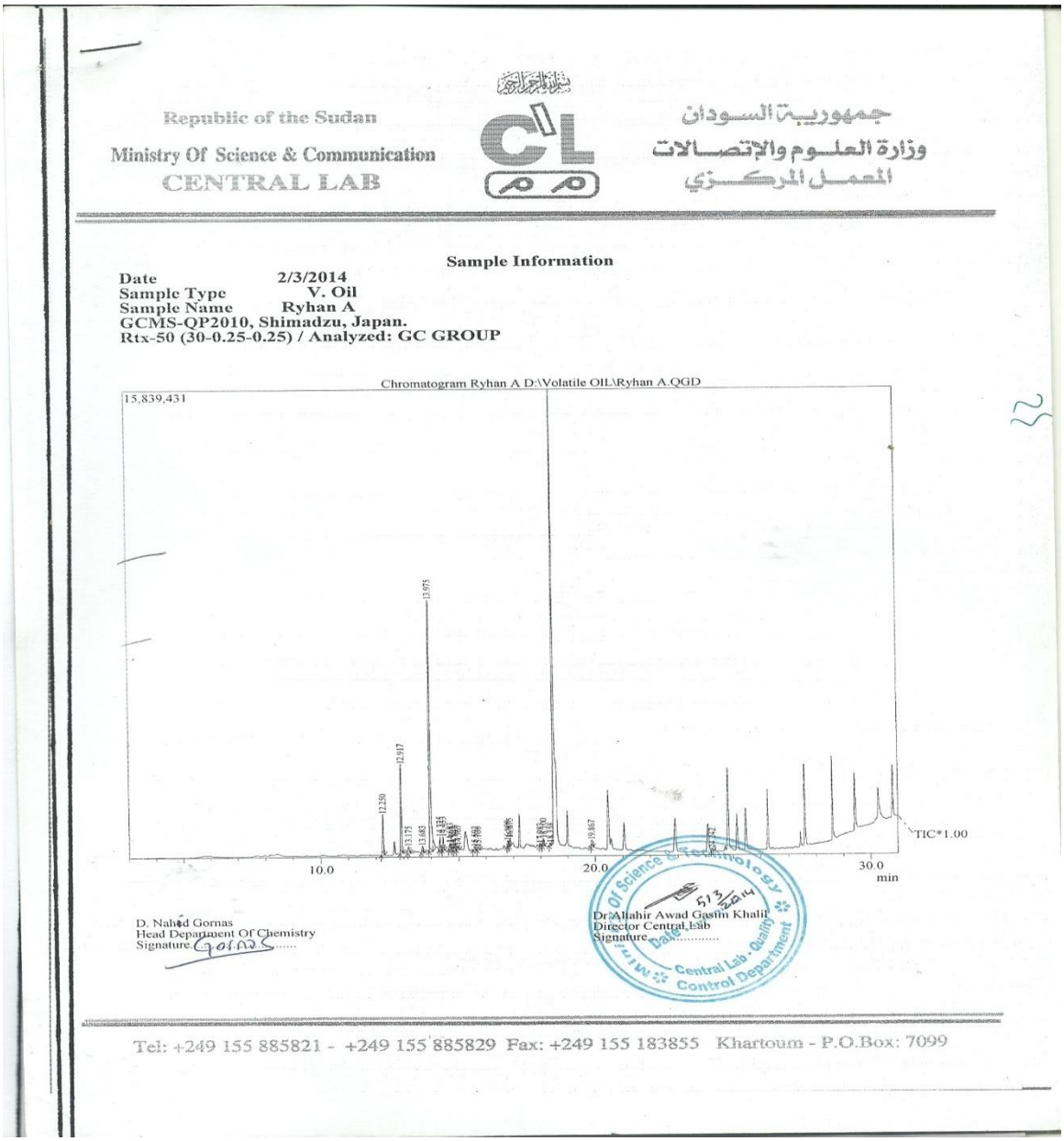
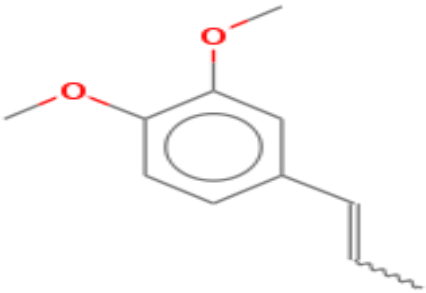
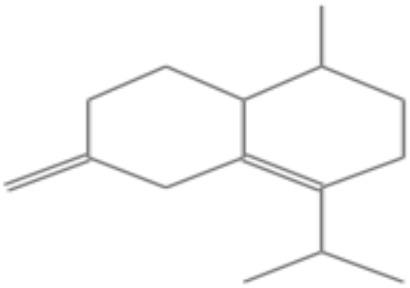


Figure (2): Representative structures of some identified compounds of essential oil *O. gratissimum*

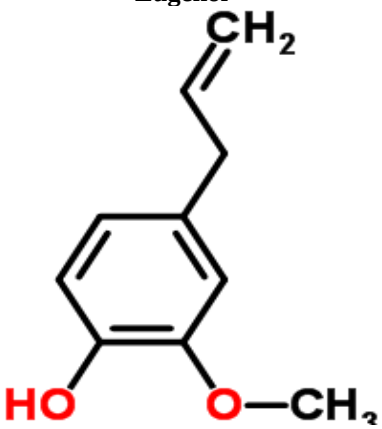
Benzene, 1,2-dimethoxy-4-(1-propenyl)-



Bicyclo[4.4.0]dec-1-ene, 2-isopropyl



Eugenol



IV. DISCUSSION

The present study was conducted to investigate the antimicrobial, antioxidant, most active of Cytotoxicity activity and essential oil of *O. basilicum* leaves showed different peaks nineteen Compounds indentified. The Compounds with high percentage area were Eugenol(54.78%), Caryophyllene (15.93%), Cyclohexane, 1-ethenyl-1-methyl-2-(1-methylethenyl)-4-(1-methylethylidene)-(7.47%). Essential oil of *O. gratissimum* leaves showed different peaks forty six Compounds indentified. The Compounds with high percentage area were Benzene, 1,2-dimethoxy-4-(1-propenyl)-(53.51%), Bicyclo[4.4.0]dec-1-ene, 2-isopropyl**(**4.12%), Eugenol (7.26%).

V. CONCLUSION

This study from the result it can be concluded that the identified compounds may have many applications like antimicrobial, anticancer and anti-inflammatory.

VI. ACKNOWLEDGEMENTS

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