International Journal of Herbal Medicine
Available online at www.florajournal.com

E-ISSN: 2321-2187
P-ISSN: 2394-0514
www.florajournal.com
IJHM 2020; 8(2): 80-87
Received: 04-01-2020
Accepted: 06-02-2020

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Syzygium aromaticum (Clove) and *Nigella sativa* (*N. sativa*) medicinal and nutritional Benefits revealed

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Abstract
Syzygium aromaticum (Clove) and *Nigella sativa* (*N. sativa*), are two valuable herbs known well for their medicinal effects and nutritional value. During this study, both herbs expressed high antioxidant effects with advantage for *Syzygium aromaticum* (Clove) over *Nigella sativa* (*N. sativa*). Methanol extract of *Syzygium aromaticum* (Clove) and *Nigella sativa* (*N. sativa*) expressed strong antimicrobial effect comparing to Chloroform extract. *Syzygium aromaticum* (Clove) contained high amounts of total flavonoids, total phenol, totalamino acid and carbohydrates contents than *Nigella sativa* (*N. sativa*). Gas Chromatography for methanol extract of both herbs also performed. Analyses of macro and micro elements showed that both herbs contain high amounts of elements. The present work walk in the same way that consider *Syzygium aromaticum* (Clove) and *Nigella sativa* (*N. sativa*), are two of the most important medicinal and nutritional herbs being used all over the world for almost on daily basis.

Keywords: *Syzygium aromaticum* (Clove), *Nigella sativa* (*N. sativa*), antioxidant, antimicrobial, gas chromatography, antimicrobial, GC-MS

1. Introduction
In current years there has been an exceptional surge of activity in herbal or botany medicine. In consequence, a wide range of ready-prepared natural treatments has discovered their way onto the shelves of herb suppliers, health-food stores, and even some chemists. While manufacturers are to be counseled for presenting the public with an alternative to chemicals, it's necessary to take note that a lot of treatments can be made at home. While naturally treating what ails you can also appear like nonsense, many wonderful cures are as common as what is determined in your herb garden. Several Crops are already regarded as a significant supply of scientific carriers for heaps for many consecutive years and a giant number of novel really helpful materials are already separated from pure vegetable sources. Several plants, as properly as their extracts, were utilized in regular medicinal practices. Medicinal vegetation plays a fundamental section in healthcare with approximately 80% from the globe's communities relying upon the use of typical medicinal practices, which can be especially depending on vegetation [1]. According to WHO, scientific plant life may want to be the very first-class provider to invulnerable a wide variety of medicines. Plant extracted drugs have made big blessings to our fitness [2]. It's due to the fact of the essential curing power of the conventional scientific packages [3]. Therapeutic vegetation are dispersed globally, however, they're most rich in tropical countries [4, 5]. Wherever you live, you will always be able to get crops that could be grown for clinical values. Obviously, of course, vegetation that are on hand to you relies generally upon your regional area; there are nearly infinite selection of recommended natural treatments, "weeds" and shrubs Even in simply closely populated areas it is typically handy to get a countless availability of a dandelion, groundsel, chickweed, coltsfoot, dock, and bindweed [6]. Pure products and options from vegetation offer new marketers for anti-microbial use. A unique characteristic of greater plants is the capability to boost a lot of herbal chemical elements of excessive structural range the so-called secondary metabolites [5]. Medical Crops are full of several supplementary metabolites with anti-microbial attributes, like tannins, terpenoids, alkaloids, and flavonoids [7-13].
The natural, remarkable extent of therapeutic vegetation collectively with the traditional understanding boosts the information of the medical crops specifications, safety, and efficacy [14]. This situation has been indicated due to the task of clinically pathogenic microbes towards the antibiotics that had been manufactured at some point of the remaining years [14, 15]. During the closing numerous years, scientific studies based upon extraction of biologically active elements from plant varieties beneficial for medical uses are intensively enhanced. [14-16]. *Syzygium aromaticum* (Clove) is known as one of the most precious spices all over the world and commonly used as a food preservative and for many medicinal purposes for many

centuries. *Syzygium aromaticum* is a medium-size (8-12m) tree derived primarily in Indonesia then rapidly transferred to many other countries across the globe [14].

Clove is characterized by its high phenolic compounds such as Gallic acid, eugenol and eugenol acetate. Eugenol is the main bioactive compound of clove, which is found in concentrations ranging from 9 381.70 to 14 650.00 mg per 100 g of fresh plant material [18].

With regard to the phenolic acids, gallic acid is the compound located in higher concentration (783.50 mg/100 g fresh weight). However, other gallic acid derivate as hydrolysable tannins are current in greater concentrations (2 375.8 mg/100 g). [19].

Among quite number medicinal plants, *Nigella sativa* (*N. sativa*) (Family Ranunculaceae) is rising as a miracle herb with a prosperous historical and religious history when you consider that many researches printed its wide spectrum of pharmacological potential. *N. sativa* is commonly regarded as a black seed. *N. sativa* is native to Southern Europe, North Africa, and Southwest Asia and it is cultivated in many nations in the world like Middle Eastern Mediterranean region, South Europe, India, Pakistan, Syria, Turkey, and Saudi Arabia [20].

The seeds of *N. sativa* and their oil have been broadly used for centuries in the cure of a number of illnesses throughout the world, and it is an essential drug in the Indian common system of the medicinal drug-like Unani and Ayurveda [21, 22]. Among Muslims, it is considered as one of the biggest forms of restoration medicine reachable due to it was once noted that black seed is the treatment for all known diseases as listed in Prophetic Medicine [23].

2. Materials and Methods

2.1. Plant collection: *Syzygium aromaticum* (Clove) and *Nigella sativa* (*N. sativa*) were purchased from a well-known herbal store in Cairo.

2.2. Microorganisms: All Microorganisms used in this study, were brought from Faculty of Agriculture, Cairo University.

2.3. Chemicals and reagents: DPPH (2, 2, diphenyl-1-picryl hydrazil radical), Folin–Ciocalteu phenol reagent and gallic acid (3, 4, 5-trihy-droxybenzoic) were obtained from Fluka Chemie (Buchs, Switzerland). Methanol, and, ethanol were from Riedel-de Haen (Sigma-Aldrich, Germany). Sodium carbonate was from PRS (Panreace Quimica, EU).

2.4. Preparation of Samples: Solvents water, Methanol and Chloroform were used to prepare Plant extracts. 10g of each sample was homogenized with 100 ml of each respective solvent; crude preparation was then left in a shaker at room temperature overnight, after which centrifuged for 20 minutes at 4000 rpm. The resulting supernatant which contains plant extract was then transferred to a pre-weighed beaker and left to concentrate by evaporating solvents at 60 °C. Finally crude extract was weighed and dissolved in a known volume of Dimethyl sulphoxide to get concentration of 20mg/ 5µl. [24].

2.5. Total Carbohydrates and Total Amino acids: Both tests done in Faculty of Agriculture, Cairo University (CURP UNIT) according to [25, 26] respectively.

2.6. Scavenging Activity on DPPH Radicals: Scavenging activity on DPPH free radicals by the extract was assessed according to the method reported by [27, 28]. Briefly, 50 µL of the ethanol extract containing varying amounts of powdered ethanol extract (1, 5, 10, and 50 µg/mL distilled water, respectively, in each reaction) was mixed with 1 mL of 0.1 mM DPPH-ethanol solution and 450 µL of 50 mM Tris-HCl buffer (pH 7.4). Reduction of DPPH free radicals was measured by reading the absorbance at 517 nm after incubation for 30 min at room temperature. In the experiment, L-ascorbic acid was used as the positive control. The inhibition percent was calculated from the following equation: % inhibition) [(absorbance of control - absorbance of the test sample)/absorbance of control] × 100.

2.7. Determination of total phenolic content: Total phenolic content in the two medicinal samplesextracts and fractions were determined using the Folin-Ciocalteu method as described by [29] briefly, 0.5 ml of the extracts or fractions was added to 3 ml of distilled water and 0.25 ml Folin– Ciocalteu reagent. The mixture was allowed to stand at room temperature for 2 min and then 0.75 ml of 20% sodium carbonate was added to the mixture and the volume was made up to 5 ml with distilled water. The absorbance of thus prepared solutions was measured at 765 nm after standing for 2 hours. The content of phenolics was expressed as Gallic acid equivalents (GAE) in mg g1 of the sample.

2.8. Determination of total flavonoid content: The total flavonoid content of the two medicinal samples was determined by using of a modified colorimetric method described previously [30]. An air-dried plant material (25 mg) was ground in a mortar with 10 ml 80 % methanol. The homogenous mixture obtained was allowed to stand for 20 min. at room temperature, followed by filtration through filter G4. An aliquot of 0.4 ml of filtrate was mixed with 0.6 ml distilled water, 5% $NaNO_2$ solution (0.06 ml) and the mixture was allowed to stand for 5 min. at room temperature. 10% of the $AlCl_3$ solution was added to the mixture after 6 minutes. Immediately, 1 N NaOH (0.4 ml) and 0.45 ml distilled water was added to the mixture and allowed to stand for another 30 min. The absorbance of the mixture was determined at 510 nm and (+) catechin was used as a standard compound for the quantification of total flavonoid content. All values were expressed as milligram of catechin equivalents per 1 gram dry weight. Data were recorded as mean ± SD for three replicates.

2.9. Antimicrobial activities: Disk assay method [31] was used to test antimicrobial activities of the two tested plants against some indicator microorganisms, *Bacillus subtilis* (ATCC6633), *Staphylococcus aureus* (ATCC 25923), *Escherichia coli* (*ATCC 35218*), *Pseudomonas aeruginosa* (ATCC9027), *Listeria monocytogenes* (ATCC7644), *Salmonella typhimurium* (ATCC14028), *Aspergillus niger* (ATCCnrrl 1957) and *pathogenic yeast* (*Candida albicans* (ATCC 10231). Discs were utilized in assay agar plates. Inoculated soft agar was layered up to 10 ml of agar (2%). Plates were then incubated at different temperatures according to each strain (Table 1). A specific volume containing 40 µg/ml of each extract was impregnated into sterilized paper discs (Whattman No.1) of 6 mm in diameter. After drying, the paper discs were plated on the test plates in triplicate and left 24 h at 4 °C to allow maximum dispersion of the test. After incubation time, inhibition zones were estimated. Antimicrobial exercises were communicated as restraint breadth zones in millimeters (mm) as pursues: - (negative) = 0 mm; + (powerless) = 1-4 mm; ++ (moderate) = 5-10 mm; +++ (solid) = 10-15 mm and ++++ (exceptionally solid) ≥ 16 mm.

The test was done in triplicate and average inhibition zone was estimated.

2.10. Plant Samples Preparation for Major and Minor Elements Extraction and Measurement

2.10.1. Sample preparation

Samples of *Syzygium aromaticum* (Clove) and *Nigella sativa* (*N. sativa*) were prepared by exact weighing 125 mg into a clean and dry Teflon digestion beaker. The following compounds were added; 2ml of Nitric acid (69%), 6ml Hydrochloric acid (37%v/v) and 1 ml Hydrofluoric acid 40%v/v) and finally High purity water was added, then heated on the hot plate with sand at mild Temperature (60-120 ˚C) for about 40 minutes. After which the solution was filtered through Whatman filter paper (N.42). Finally filtered solution was transferred to 50 ml tube, filled to the mark by deionized water. A control digest was carried in the same way. All samples and control were performed in triplicate.

2.10.2. Instrumentation

Major and traceelements were analytically determined using ICPMS (Inductively Coupled Plasma-Mass Spectrophotometer) [32].

Basic organic and inorganic chemical profiles of plant and other environmental samples were focused on using gas chromatography and mass spectral studies as one of the main established diagnostic tools. GC–MS analysis of the plant extract was performed according to [33] by using Agilent GC–MS built with bonded-phase fused silica capillary column (30 mm · 0.25 mm ID; df = 0.25) (J&W Scientific, Folsom, CA, year) and mass spectrum for identification of the corresponding metabolites with correlation by known spectra. Instrumentation of GC–MS operating key procedure for volatile and semi volatile organic compounds are as follows. Column flow used highly reactive helium as a carrier gas at 1.5 ml/min. The split less injection was maintained at 260 C. The split less injection mode was used with a split ratio of 40:1. The transfer line temperature was set at 260 C. The mass analyzer (mz) was set at 60 eV, electron impact source temperature at 200 C, electron multiplier voltage at 1588 mV and solvents delay at 2 min. All scanned data were obtained by the full-scan mass spectra within the scan range of 50–400 amu. The oven temperature program was as follows: increased from 190 to 250 C at a rate of 220 C/min, and from 200 to 260 C at a rate of 1 C/min. Finally, the acquired spectrum of plant extracts was compared with the standard known database in the NIST library and confirmed as scrupulous compound**.**

3. Results& Discussion

3.1. Total Flavonoid and Total Phenol Contents of the Extracts: It has been recognized that flavonoids show antioxidant activity and their effects on human nutrition and health are considerable. The mechanisms of action of flavonoids are through scavenging or chelating process [34, 35]. Table (1) showed Total Flavonoids& Total Phenol for the two plants under test; data revealed that *Syzygium aromaticum* (Clove) showed the highest amounts of both Total Flavonoids& Total Phenols comparing to *Nigella sativa* (*N. sativa*), Methanol extract of Clove showed 83.966Mg/G and 222.56Mg/G when tested for Total Flavonoids and Total Phenols contents respectively, while Chloroform extract for the same plant showed 43.882 Mg/G and 126.8 Mg/G for Total Flavonoids and Total Phenols contents respectively. Methanol extract of *Nigella sativa* (*N. sativa*) showed 8.6920Mg/G and 18.68 Mg/G for Total Flavonoids and Total Phenols content, while Chloroform extract of the same plant showed a Flavonoids content of 0.316 Mg/G and Phenol content of 2.12 Mg/G.

It is well clear from Table (1), that Methanol extract of both plants produced highest amounts of Flavonoids and Phenols contents comparing to Chloroform extract; this finding is in full agreement with that obtained by [36]. The whole results obtained from Table (1) indicated that *Syzygium aromaticum* (Clove) possess high amounts of Flavonoids and Phenols, this observation also reported by several Scientists who concluded that *Syzygium aromaticum* (Clove) is one of the most valuable herb used all over the globe due to its high contents of different beneficial constituents [37].

Table 1: Total Flavonoids& Total Phenols

Plant	Type of Extract	Total Flavonoids Mg/g(D.W)	Total Phenol Mg/g (D.W)
Syzygium aromaticum (Clove)	Methanol	83.966	222.56
Syzygium aromaticum (Clove)	Chloroform	43.882	126.8
Nigella sativa (*N. sativa*)	Methanol	8.6920	18.68
Nigella sativa (*N. sativa*)	Chloroform	0.316	2.12

3.2. Antioxidant activity: The stable free radical DPPH has become widespread to evaluate the free radical-scavenging power of several nutritional anti-oxidants [38, 39]. The decrease capacity of the DPPH radical depends upon the reduction in its absorbance at 517 nm, caused by anti-oxidants [40]. The free radical-scavenging action coming from all extracts at 50-200 µl was considered as percentage inhibition within the DPPH radical type technique. The DPPH radical-scavenging activity of *Syzygium aromaticum* (Clove) and *Nigella sativa* (*N. sativa*) methanol extract and Chloroform extract, at various concentrations (50µl, 100 µl, 150 µl &200 µl) is shown in Table 2.

It's clear that there was a concentration- dependent scavenging activity; At 200µl, the inhibition percent of Me-OH, extracts was determined as 95.686% and 60.745% in *Syzygium aromaticum* (Clove) and *Nigella sativa* (*N. sativa*), respectively, while at the same concentration (200µl), the inhibition percent of Chloroform extracts was determined as 94.612% and 52.531% in *Syzygium aromaticum* (Clove) and *Nigella sativa* (*N. sativa*), respectively. Data obtained from Table 2, revealed that methanol extract showed higher DPPH radical scavenging activity compared to chloroform extract. The whole data from Table 2 is highly indicated that methanol extract of *Syzygium aromaticum* (Clove) exhibited the highest DPPH radical scavenging activity compared to and *Nigella sativa* (*N. sativa*). The largest DPPH radical scavenging activity of *Syzygium aromaticum* (Clove) appears to be related to the substantial content level of phenolic substances found in this extract, which could possibly be the electron contributors, and therefore can interact with free radicals to transform them to much more steady products and cease radical chain reaction, that might makes this natural herb has exploitable free radical cleansing actions.; this finding is in a full agreement with that obtained by [41, 42].

Table 2: Free radical scavenging activities of *Syzygium aromaticum* (Clove) and *Nigella sativa* (*N. sativa*)

Sample ID	Sample Concentration µg/ml	DPPH% "RSA"
Syzygium aromaticum (Clove) *Methanol Extract*	50	94.980
	100	95.294
	150	95.529
	200	95.686
Syzygium aromaticum (Clove) Chloroform Extract	50	87.918
	100	90.612
	150	91.878
	200	94.612
Nigella sativa (*N. sativa*) Methanol Extract	50	55.333
	100	56.667
	150	59.020
	200	60.745
Nigella sativa (*N. sativa*) Chloroform Extract	50	50.163
	100	50.857
	150	51.0755
	200	52.531

3.3. Total amino acid and Total carbohydrates: Results of total amino acid and total carbohydrates are presented in Table 3, indicated that both plants; *Syzygium aromaticum* (Clove)and *Nigella sativa* (*N. sativa*) possess a considerable amounts of total amino acid and total carbohydrates.

Syzygium aromaticum (Clove) contains 14.77 (G/100g) & 80.743(G/100g) on dry weight of both total amino acid and total carbohydrates respectively, *Nigella sativa* (*N. sativa*) possess 12.54(G/100g) & 65.549(G/100g) on dry weight of total amino acid and total carbohydrates respectively, this data confirm the fact that *Syzygium aromaticum* (Clove) and *Nigella sativa* (*N. sativa*) lying among the most precious vegetables due to their high content of valuable constituents and medicinal effects; the same finding was also reported by many previous researches [43-46].

Table 3: Total Amino acid& Total Carbohydrates Content

Plant	Total Amino Acid (G/100g) "Dry Weight"	Total carbohydrates (G/100g) "Dry Weight"
Syzygium aromaticum (Clove)	14.77	80.743
Nigella sativa (*N. sativa*),	12.54	65.549

3.4. Antimicrobial Activity: Table 4 showed the Microbial strains used throughout this study; three Gram positive strains namely, *Staphylococcus aureus* (ATCC 25923), *Bacillus Subtilis* (ATCC6633) and *Listeria monocytogenes* (ATCC7644); three Gram negative Strains namely, *Salmonella typhimurium* (ATCC14028), *Escherichia coli* (ATCC35218) and *Pseudomonas aeruginosa* (ATCC9027), one fungus which was *Aspergillus niger* (ATCCnrrl 1957) and *Candida albicans* (ATCC 10231) as a yeast strain. Each microorganisms purified in its specific selective medium and incubated under suitable Temperature specific for the strains.

Table 4: Microbial strains used to test theAntimicrobial activities of the two tested Medicinal Plants.

Microbial Group	Indicator Strain	Cultivation Conditions*
Gram positive Bacteria	*Staphylococcus aureus* (ATCC 25923)	TSA+ YE, 37 °C
	Bacillus Subtilis (ATCC6633)	TSA+ YE, 37 °C
	Listeria monocytogenes (ATCC7644)	TSA+ YE, 37 °C
Gram negative Bacteria	*Salmonella typhimurium* (ATCC14028)	TSA+ YE, 37 °C
	Escherichia coli (ATCC35218)	TSA+ YE, 37 °C
	Pseudomonas aeruginosa (ATCC9027)	TSA+ YE, 37 °C
Fungus	*Aspergillus niger* (ATCCnrrl 1957)	PDA, 25 °C
Yeast	*Candida albicans* (ATCC 10231)	TSA+ YE, 30 °C

It was clear from Table (5) that both plants *Syzygium aromaticum* (Clove) & *Nigella sativa* (*N. sativa*), has the same antimicrobial activities against the tested Microbes without even minor difference, whereas Methanol Extract of both plants expressed very strong antimicrobial activity (+++) against *Staphylococcus aureus* (ATCC 25923), *Bacillus Subtilis* ((ATCC 6633), *Listeria monocytogenes* (ATCC 7644), *E. coli* (ATCC 35218), *Aspergillus niger* (ATCC 1957) and *Candida albicans* (ATCC 10231), but expressed a weak antimicrobial activity (+) against *Pseudomonas aeruginosa (ATCC 9027)* and *Salmonella. typhi* (ATCC 14028).

Concerning Chloroform Extract, both plants expressed a weak antimicrobial activity (+) against all tested Microorganisms. Therefore, we could concluded that Methanol Extract has antimicrobial advantage over Chloroform Extract, this observation recommend the use of Methanol Extract instead of Chloroform Extract to get the maximum antimicrobial activity.

Syzygium aromaticum (Clove) & *Nigella sativa* (*N. sativa*) were used almost everywhere in the globe as Medicinal herbs due to their ability to fight some diseases [46-48].

Table 5: Antimicrobial activities of *Syzygium aromaticum* (Clove) & *Nigella sativa* (*N. sativa*)

Anti-microbial Activities								
	Gram Positive Bacteria		Gram Negative Bacteria		Fungus & Yeast			
Plant Extract	***S. aureus***	***B. subtilis***	***L. monocytogenes***	***E. coli***	***P. aeruginosa***	***S. typhi***	***A. niger***	***C. albicans***
Syzygium aromaticum (Clove) (*Methanol Extract*)	+++	+++	+++	+++	+	+	+++	+++
Syzygium aromaticum (Clove) (*Chloroform Extract*)	+	+	+	+	+	+	+	+
Nigella sativa (*N. sativa*) (*methanol Extract*)	+++	+++	+++	+++	+	+	+++	+++
Nigella sativa (*N. sativa*) (*Chloroform Extract*)	+	+	+	+	+	+	+	+

Antimicrobial activities were expressed as inhibition zones in millimeters (mm):
- (Negative) = 0 mm, + (weak) =1-4 mm' ++ (moderate) = 5-10 mm; +++ (strong) = 10-15 mm; and ++++ (very strong) ≥ 16 mm.
** Microorganisms used were *S. aureus* (*ATCC 25923*), *B. subtilis* (*ATCC 6633*), *L. monocytogenes* (*ATCC 7644*), *E.coli* (*ATCC 35218*), *P. aeruginosa* (*ATCC 9027*), *S. typhi* (*ATCC 14028*), *A. niger* (*ATCC 1957*) and *C. albicans* (*ATCC 10231*).

3.5. Major and Minor Elements: Data present in Table 6 and Table7showed macro and micro elements constituents of *Syzygium aromaticum* (Clove) & *Nigella sativa* (*N. sativa*), as shown from the data, *Syzygium aromaticum* (Clove) showed 995.1472ug/g, 916.6816 ug/g, 4911.7848 ug/g and 22937.1588 ug/g of the macro elements, Na, P, K and Ca respectively, while *Nigella sativa* (*N. sativa*) showed 67.1836 ug/g, 3777.8940 ug/g, 2469.5660 ug/g and 19876.8804 ug/g for the same macro elements respectively. Concerning micro elements, *Syzygium aromaticum* (Clove) showed 4318.9288 ug/g, 184.8920 ug/g, 1261.4844 ug/g, 0.8428 ug/g, 10.5628 ug/g and 14.2404 ug/g of the micro elements, Mg, Mn, Fe, Co, Ni and Cu respectively; on the other hand, *Nigella sativa* (*N. sativa*) showed 4296.7876 ug/g, 51.6576 ug/g, 1081.7304 ug/g, 0.9208 ug/g, 15.220 ug/g and 20.5384 ug/g for the same micro elements respectively.

Table 6: Macro Elements in Seeds of *Syzygium aromaticum* (Clove) & *Nigella sativa* (*N. sativa*)

Element	***Syzygium aromaticum* (Clove) (ug / g)**	***Nigella sativa* (*N. sativa*) (ug / g)**
Na	995.1472	67.1836
P	916.6816	3777.8940
K	4911.7848	2469.5660
Ca	22937.1588	19876.8804

Table 7: Micro Elements in Seeds of *Syzygium aromaticum* (Clove) & *Nigella sativa* (*N. sativa*)

Element	***Syzygium aromaticum* (Clove) (ug / g)**	***Nigella sativa* (*N. sativa*) (ug / g)**
Mg	4318.9288	4296.7876
Mn	184.8920	51.6576
Fe	1261.4844	1081.7304
Co	0.8428	0.9208
Ni	10.5628	15.220
Cu	14.2404	20.5384

3.6. GC-MC Analysis: The methanol crude extract of *Syzygium aromaticum* (Clove) showed nineteen peaks in the GC-MS chromatogram (Figure1and Table8) which were identified according to their retention time on fused silica capillary column These compounds mainly comprised of esters, alcohols and hydrocarbons,. Chavicol was identified as a major chemical constituent followed by A-1-p-menthen-8-yl acetate, Eugenol, Caryophyllene, Humulene, α-Farnesene, δ-Cadinene, Cis-Calamenene, Eugenol acetate, Caryophyllene oxide, Humulene-1,2-epoxide, Caryophylla-4(12),8(13)-dien-5α-ol, 2,3,4-trimethoxyacetophenone, Benzyl benzoate, Farnesyl acetate, Methyl palmitate, Methyl stearate, Squalene and ℘-Tocopheryl methyl ether.

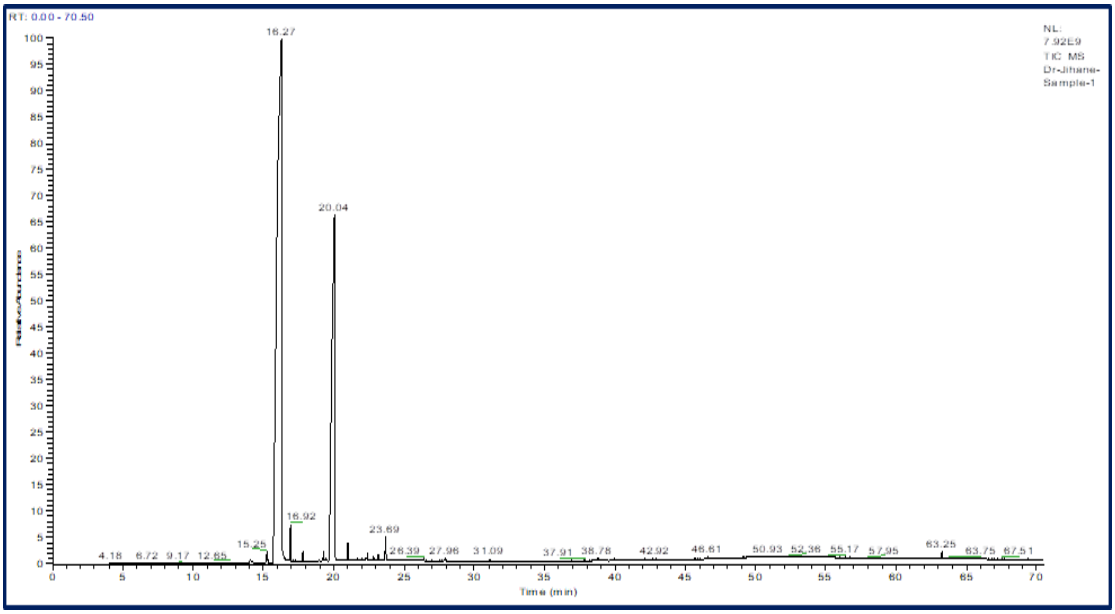

Fig 1: GC-MS chromatogram of Methanol extract of *Syzygium aromaticum* (Clove)

Table 8: Chemical composition of Methanol extract of *Syzygium aromaticum* (Clove)

Nº	Tr.(min.)	Proposed compound	Formula	M.W.
1	14.04	Chavicol	C9H10O	134
2	15.25	1-p-menthen-8-yl acetate	C12H20O2	196
3	16.27	Eugenol	C10H12O2	164
4	16.92	Caryophyllene	C15H24	204
5	17.80	Humulene	C15H24	204
6	18.95	α-Farnesene	C15H24	204
7	19.29	δ-Cadinene	C15H24	204
8	19.48	Cis-Calamenene	C15H22	202
9	20.04	Eugenol acetate	C12H14O3	206
10	21.01	Caryophyllene oxide	C15H24O	220
11	21.66	Humulene-1,2-epoxide	C15H24O	220
12	22.37	Caryophylla-4(12),8(13)-dien-5α-ol	C15H24O	220
13	23.69	2,3,4-trimethoxyacetophenone	C11H14O4	210
14	25.41	Benzyl benzoate	C14H12O2	212
15	26.22	Farnesyl acetate	C17H28O2	264
16	27.96	Methyl palmitate	C17H34O2	270
17	31.64	Methyl stearate	C19H38O2	298
18	42.08	Squalene	C30H50	410
19	46.61	℘-Tocopheryl methyl ether	C29H50O2	430

The methanol crude extract of *Syzygium aromaticum* (Clove) showed nineteen peaks in the GC-MS chromatogram (Figure1and Table8) which were identified according to their retention time on fused silica capillary column These compounds mainly comprised of esters, alcohols and hydrocarbons,. Chavicol was identified as a major chemical constituent followed by A-1-p-menthen-8-yl acetate, Eugenol, Caryophyllene, Humulene, α-Farnesene, δ-Cadinene, Cis-Calamenene, Eugenol acetate, Caryophyllene oxide, Humulene-1,2-epoxide, Caryophylla-4(12),8(13)-dien-5α-ol, 2,3,4-trimethoxyacetophenone, Benzyl benzoate, Farnesyl acetate, Methyl palmitate, Methyl stearate, Squalene and ℘-Tocopheryl methyl ether.

Spectroscopic analysis of the Sixteen active compounds separated from GC analysis of *Nigella sativa* (*N. sativa*) extract in present study was found in (Figure 2 and Table 9) These fraction were Glycerol, α-terpinyl acetate, Eugenol, trans-Caryophyllene, Eugenyl acetate, Methyl myristate, -Hexadecenoic 9-Hexadecenoic acid, methyl ester, Methyl palmitate, Methyl linoleate,

Methyl oleate, Methyl stearate, cis-11, 14-Eicosadienoic acid, methyl ester, Glyceryl palmitate, Glyceryl palmitate, Linoleic acid, Linoleic acid.

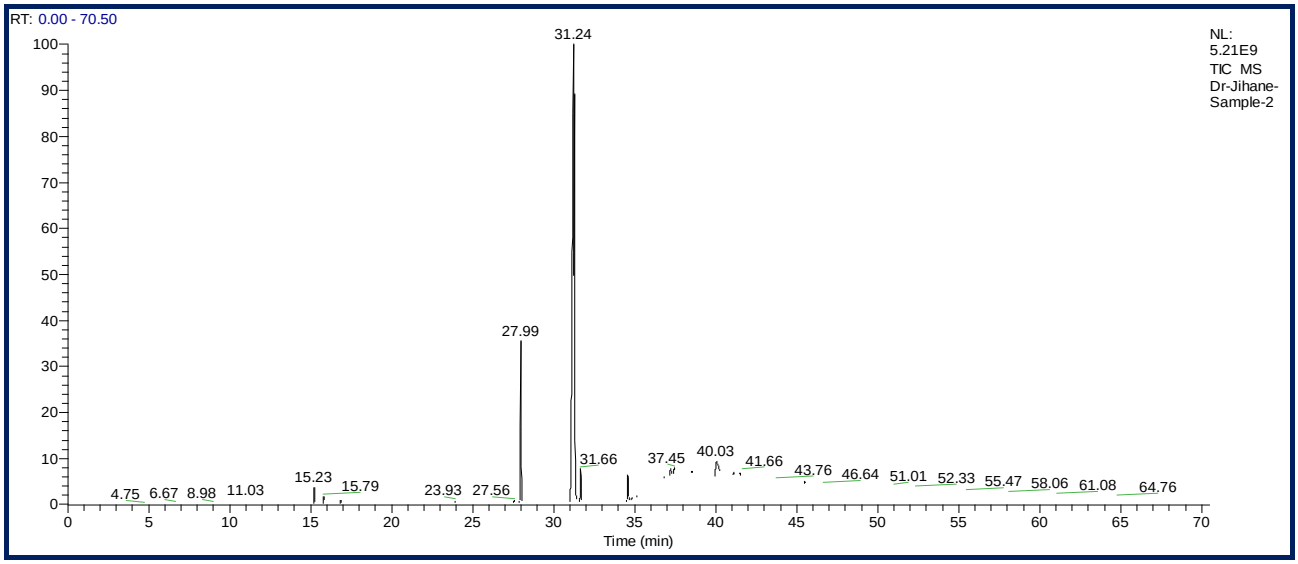

Fig 2: GC-MS chromatogram of Methanol extract of *Nigella sativa* (*N. sativa*).

Table 9: Chemical composition of Methanol extract of *Nigella sativa* (*N. sativa*).

Nº	Tr.(min.)	Proposed compound	Formula	M.W.
1	11.03	Glycerol	C3H8O3	92
2	15.23	α-terpinyl acetate	C12H20O2	196
3	15.79	Eugenol	C10H12O2	164
4	16.84	trans-Caryophyllene	C15H24	204
5	19.76	Eugenyl acetate	C12H14O3	206
6	23.93	Methyl myristate	C15H30O2	242
7	27.56	9-Hexadecenoic acid, methyl ester	C17H32O2	268
8	27.99	Methyl palmitate	C17H34O2	270
9	31.24	Methyl linoleate	C19H34O2	294
10	31.30	Methyl oleate	C19H36O2	296
11	31.66	Methyl stearate	C19H38O2	298
12	34.58	cis-11,14-Eicosadienoic acid, methyl ester	C21H38O2	322
13	34.80	Glyceryl palmitate	C19H38O4	330
14	37.21	Glyceryl palmitate	C19H38O4	330
15	37.45	Linoleic acid	C18H32O2	280
16	40.03	Linoleic acid	C18H32O2	280

4. Conclusion

Based on the information presented, it could be concluded that *Syzygium aromaticum* (Clove) and *Nigella sativa* (*N. sativa*) represent very interesting herbs with an enormous potential as food preservative and as rich sources of antioxidant compounds. It's proved biological activities suggest the development of medicinal products for human and animals uses and confirm why this plant has been employed for centuries almost around the globe.

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