Characterization of aromatic compounds and antimicrobial properties of four spice essential oils from family *Lamiaceae*

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Abstract

Introduction. Representatives of the Lamiaceae family are widely used in the food industry as they are characterized by a high content of aromatic compounds.

Materials and methods. It was evaluated the chemical composition and antibacterial activity of essential oils of garden thyme (*Thymus vulgaris* L.), rosemary (*Rosmarinus officinalis* L.), spearmint (*Mentha spicata* L.), and sweet basil (*Ocimum basilicum* L.).

Results and discussion. The percentage ratio of volatile components obtained by GC-MS analysis of essential oil from garden thyme contains: thymol (37.90%) and *γ*-terpinene (19.44%). It has been determined eucalyptol (19.89%) and camphor (16.86%) in the essential oil of rosemary and carvone (50.23%) and limonene (13.90%) in spearmint oil, respectively. The differences in the quantitative and qualitative composition of essential oils and their aromatic components in relation to the previous researches may be probably due to different environmental and genetic factors, different chemotypes and the nutritional status of the plants as well as other factors that can influence the oil composition. *Escherichia coli* was the most susceptible bacterium strain. The essential oils of spearmint and rosemary possessed the most pronounced antibacterial activities against *Escherichia coli* (with inhibition zone: 32.00 mm and 30.00 mm).

Conclusions. The results obtained provide a basis for a thorough examination of the chemical composition and antimicrobial properties of various representatives of Lamiaceae family with a view to a wide usage in food technology.

Introduction

The family of Lamiaceae (also known as Labiatae) has very large distribution, containing about 236 genera and 6900 to 7200 species. Representatives of the Lamiaceae family are widely used for various purposes, but their most extensive usage is in the food industry as they are characterized by a high content of aromatic compounds. Sweeet basil, spearmint, rosemary, sage, oregano and garden thyme are only some of the species with wide usage in culinary production all over the world [22].

Garden thyme (*Thymus vulgaris* L.) is an evergreen herb, native to the southern Europe and the Mediterranean [20]. The plant has been used since ancient times as a culinary ingredient, to add flavor to cheeses [4, 2] and liqueurs [29, 26] and to flavor meats such as rabbit, boar, and lamb [12].

The herb garden thyme is pungent in taste and contains protein, crude fiber, minerals, vitamins, etc. [3]. The essential oil of garden thyme and the compound thymol have antimicrobial activity in vitro against *Escherichia coli* strains [7, 13]. Garden thyme essential oil is one of the most commonly used aromatic products in the home kitchens as well as in the food industry as preservatives and antioxidants.

A study including 21 essential oils and five pathogenic bacteria, demonstrated that the garden thyme had one of the most potent bacteriostatic and bactericidal effects against *Escherichia coli*, *Salmonella enteritidis*, *Listeria monocytogenes*, and *Staphylococcus aureus* [36].

Rosemary (*Rosmarinus officinalis* L.) is one of the most economically important plants of the family Lamiaceae. The name "rosemary" derives from the Latin words "ros", meaning "dew" and "marinus," meaning "sea" – "dew of the sea". Rosemary has been used in the culinary since decades. Native to the Mediterranean region, the plant is now widely distributed all over the world mainly due to its culinary, medicinal, and commercial uses including in the fragrance and food industries [21]. Both fresh and dried leaves of rosemary have been used for their characteristic aroma in cooking or consumed in small amounts as herbal tea, while rosemary extracts are routinely employed as natural antioxidant to improve the shelf life of perishable foods. The culinary, medicinal, and fragrance uses of rosemary are attributed to the vast arrays of chemical constituents collectively known as plant secondary metabolites [40]. Moreover, one group aromatic compounds are with small molecular weight, called essential oils which play vital role in the fragrance and culinary properties of the plant [15]. The application of rosemary in the culinary practice is related to the corresponding chemotype of the spice, which has pronounced flavoring properties.

According to Fu et al. [18] minimum inhibitory concentrations of rosemary essential oil ranged from 0.125% to 1.000% (v/v) and possessed significant antimicrobial effects against Gram-positive bacteria, three Gram-negative bacteria.

Spearmint (*Mentha spicata* L.) is an aromatic plant that can be used fresh or as dried leaves or powder, as a seasoning and flavoring herb, or traditionally as herbal tea [25]. In addition, spearmint essential oil has economic relevance due to its use in perfumery, confectionary, cosmetics and pharmaceutical preparations. The fresh and dried spearmint leaves have been used as a flavoring agent in various food products, including cheese and dough (Iranian yoghurt drink), chocolate, beverages, jellies, syrups, candies, ice creams, and chewing gum [32].

Spearmint essential oil had strong activity against *S. aureus*, *E. coli*, *Candida albicans* and *C. tropicalis* [35]. Besides its flavoring properties, spearmint is also widely used as an antimicrobial agent and as a preservative in food, mainly because of its oxygenated compounds [27, 11].

Sweet basil (*Ocimum basilicum* L.), is a culinary herb of major importance. Most culinary and ornamental basils are cultivars of the species *O. basilicum*, but other species are also grown and there are many hybrids between species [38]. Sweet basil can be dried or used fresh, similar to many other pot-herbs. It is best used fresh, as dried it will lose its flavor. Sweet basil leaves containing essential oil of distinctive aroma can be used both fresh and dried to spice up various kinds of meals. Apart of culinary use, sweet basil has been traditionally applied as a medicinal herb [33]. The presence of essential oil and its composition determine the specific aroma of plants and the flavor of the condiment [33]. Although essential oils in different basil cultivars are variable, prevalent components are monotherpenes and phenylpropanoids [28]. Fresh sweet basil leaves is used as an ingredient in various dishes and food preparations, especially in the Mediterranean cuisine. Due to its antimicrobial [9, 37] and insecticidal [8] activities and very pleasant aroma, sweet basil essential oil is widely used in the food.

Its usage in culinary practice is based on the possibility of fresh and dried leaves to emphasize meat and vegetable flavors, giving them a pronounced aromatic flavor. Most often aromatic components in fresh spices are obtained by low temperature extraction with vegetable oils used in culinary practice. The resulting aromatic oil substances are successfully used, such as salad dressings, spices for meat and vegetable soups, poultry and game dishes.

Due to the wide use of the Lamiacea spices in the food technology and the scarce information in Bulgaria about their aromatic composition and antimicrobial properties against foodborne pathogens, it have been involved the need for their further examination.

The aim of the present study is to characterize the aromatic components in the essential oils of four spices of the family Lamiaceae and antimicrobial properties against pathogenic bacteria, causing foodborne illnesses, with potential possibilities for their application in food technology.

Materials and methods

Plant Material

Garden thyme (*Thymus vulgaris* L.), rosemary (*Rosmarinus officinalis* L.), spearmint (*Mentha spicata* L.), sweet basil (*Ocimum basilicum* L.) were purchased from the merchant local market in Plovdiv. Samples were identified by an expert in Agricultural University of Plovdiv, Bulgaria.

The moisture content of raw materials was determined by drying to constant weight at 105°C [34].

Essential oils

The essential oils were obtained with modification of hydrodistillation for 150 min in the laboratory glass apparatus according to the British Pharmacopoeia [6].

The oils were dried over anhydrous sulfate and stored in tightly closed dark vials at 4 °C until analysis.

The GC-MS analysis was carried out with an Agilent 5975C MSD system coupled to an Agilent 7890A gas chromatograph (Agilent Technologies Inc., Santa Clara, CA). Agilent J&W HP-5MS column (0.25 µm, 30 m x 0.25 mm) was used with helium as a carrier gas (1.0 mL min^{-1}). The operational conditions were: oven temperature 35 °C/3 min, 5 °C/min to 250 °C for 3 min, total run time 49 min; injector temperature 260 °C; ionization voltage 70 eV; ion source temperature 230 °C; transfer line temperature 280 °C; solvent delay 4.25 min and mass range 50 – 550 Da. The MS was operated in scan mode. One µL of the sample was injected into the GC/MS system at split ratio 30:1. The GC analysis was carried out using an Agilent 7890A GC system; FID temperature 270 °C. In order to obtain the same elution order with GC/MS, simultaneous triplicate injections were done by using the same column and the same operational conditions.

The identification of compounds was made by comparing their mass spectra with those from mass spectra libraries [1] and by comparing the literature and estimated Kovat's (retention) indices that were determined using mixtures of homologous series of normal alkanes from C_8 to C_{40} in hexane, under the conditions described above. The percentage ratio of volatile components was computed using the normalization method of the GC/FID peak areas.

Determination of antibacterial activity

As test microorganisms were used strains of pathogenic bacteria, reported as causing foodborne infections, intoxications and toxicoinfections. Antibacterial activity of essential oils was tested against Gram-positive bacteria – *Listeria monocytogenes* NCTC 11994 and *Staphylococcus aureus* ATCC 25093, and Gram-negative bacteria – *Escherichia coli* ATCC 8739 and *Salmonella enterica* subsp. *enterica* serovar Abony NCTC 6017. The selective growth media were: *Listeria* Oxford Agar Base /Merck/; Baird Parker Agar Base with Egg Yolk Tellurite emulsion supplement /Merck/, Rapid' *E.coli* 2 Agar /BioRad/ and Mac CONKEY Agar /Merck/, respectively.

The media were inoculated with 24-hour suspension of the bacterial species.

Melted and cooled to 45 °C selective media were inoculated with the tested microorganisms and next equally dispensed into Petry dishes. After setting of the media, sterile rings (Ø 6 mm) were placed on, and the amount of each sample (0.05 mL) was put into the rings. Petry dishes were incubated at 37 °C for 24 or 48h according to the bacterial spices, and then the distinct zone of growth inhibition (mm) around the rings was measured. The used inoculums have resulted as an actual concentration cells of *L. monocytogenes, S. aureus*, *E. coli*, *S. enterica* into the responding selective medium about 3×10^5 CFU/mL. The total plate count was estimated by the conventional plate-counting technique using appropriate dilution.

Results and discussion

Chemical composition of essential oils

Garden thyme (*Thymus vulgaris* L.).

The moisture of the plants was determined as 82.75%±0.80. The yield of essential oil was 0.56%±0.00 (in abs. dry mass was 3.26%±0.03). The oil was light yellow liquid with a characteristic, spicy-phenolic odor (Table 1). The oil is consisted by 35 components, representing 98.89% of the total content. Twelve of them were in concentrations over 1% and the rest 23 constituents were in concentrations under 1%. The major constituents (up 3%) of the oil were as follows: thymol (37.90%), *γ*-terpinene (19.44%), *p*-cymene (8.84%), *δ*-2-carene (3.92%), carvacrol (3.60%), and *β*-caryophyllene (3.37%). The results indicated that Bulgarian essential oil obtained from *T. vulgaris* is from thymol chemotype [19], which may also have a profound influence on its bioactivity, flavor, and aroma profile.

Table 1
Chemical composition of essential oil of garden thyme, rosemary, spearmint, sweet basil

№	Compounds	RI	Content, %			
			Garden thyme	Rosemary	Spearmint	Sweet basil
1	Tricyclene	922	-*	0.42±0.00	-	-
2	*α*-Pinene	939	2.39±0.02	13.37±0.12	1.31±0.01	0.56±0.00
3	Camphene	954	0.33±0.00	7.22±0.07	0.27±0.00	0.10±0.00
4	Sabinene	969	0.26±0.00	0.10±0.00	0.86±0.00	0.48±0.00
5	*β*-Pinene	979	0.37±0.00	2.37±0.02	1.24±0.01	0.79±0.00
6	Octen-3-ol	982	2.81±0.02	-	-	-
7	*β*-Myrcene	991	2.22±0.02	1.81±0.01	1.63±0.01	0.89±0.00
8	*α*-Phellandrene	996	-	4.27±0.04	-	-
9	*δ*-2-Carene	998	3.92±0.03	2.13±0.02	-	-
10	*α*-Terpinene	1018	-	-	0.24±0.00	-
11	*p*-Cymene	1025	8.84±0.08	-	-	-
12	Limonene	1030	0.54±0.00	-	13.90±0.12	0.33±0.00
13	Eucalyptol	1032	0.24±0.00	19.89±0.18	0.99±0.00	8.26±0.08
14	*cis*-*β*-Ocimene	1040	-	0.15±0.00	-	1.48±0.01
15	2-Phenylethanal	1047	-	0.10±0.00	-	-
16	*trans*-*β*-Ocimene	1050	0.36±0.00	0.13±0.00	0.20±0.00	0.13±0.00
17	*γ*-Terpinene	1055	19.44±0.18	2.26±0.02	0.46±0.00	0.28±0.00
18	*α*-Terpinolene	1088	-	1.81±0.01	0.38±0.00	-
19	*β*-Linalool	1092	2.59±0.02	0.96±0.00	0.53±0.00	30.52±0.29
20	*p*-Mentha-3-one	1131	-	-	0.87±0.00	-
21	(+)-Camphor	1126	-	16.86±0.16	-	0.33±0.00
22	*trans*-Menthone	1136	-	-	1.11±0.01	-
23	Pinocarvone	1157	-	0.67±0.00	-	-
24	Isomenthol	1158	-	-	0.30±0.00	-
25	Terpinen-4-ol	1163	-	-	-	0.90±0.00
26	(-)-Menthol	1164	-	-	0.84±0.00	-
27	Borneol	1169	1.65±0.01	5.27±0.05	-	-
28	(+)-Menthol	1168	-	-	1.29±0.01	
29	Terpinene-4-ol	1179	0.71±0.00	2.20±0.02	-	-
30	Methylchavicol	1186	-	-	-	13.16±0.12
31	Piperitol	1196	-	0.38±0.00	-	-
32	Dihydrocarvone	1204	-	-	3.37±0.03	-
33	cis-Carveol	1208	-	-	0.34±0.00	-
34	*α*-Terpineol	1189	0.37±0.00	4.10±0.04	-	1.07±0.01
35	Verbenone	1193	-	3.69±0.03	-	-

Table 1 (Continue)

Chemical composition of essential oil of garden thyme, rosemary, spearmint, sweet basil

№	Compounds	RI	Content, %			
			Garden thyme	Rosemary	Spearmint	Sweet basil
36	β-Citral	1215	0.13±0.00	-	-	-
37	Pulegone	1216	-	-	0.87±0.00	-
38	(-)-Carvone	1218	-	-	50.23±0.49	-
39	Piperitone	1228	-	0.25±0.00	-	-
40	Thymol methyl ether	1229	0.98±0.00	-	-	-
41	*p*-Menth-1-en-3-one	1231	-	-	2.22±0.02	-
42	Thymoquinone	1260	0.22±0.00	-	-	-
43	Isomenthyl acetate	1282	-	-	0.79±0.00	-
44	Thymol	1290	37.90±0.36	-	-	-
45	Bornyl acetate	1285	-	3.37±0.03	-	0.51±0.00
46	Carvacrol	1292	3.60±0.03	-	-	-
47	Eugenol	1337	0.51±0.05	0.41±0.00	-	11.74±0.09
48	*cis*-Carvyl acetate	1344	-	-	1.11±0.01	-
49	*trans*-Carveyl acetate	1365	-	-	0.25±0.00	-
50	Methyleugenol	1371	0.11±0.00	0.53±0.00	-	-
51	β-Bourbonene	1388	-	-	1.21±0.01	-
52	β-Elemene	1391	-	-	0.47±0.00	2.28±0.02
53	β-Caryophyllene	1419	3.37±0.03	1.20±0.01	2.77±0.02	0.42±0.00
54	α-Bergamotene	1426	-	-	-	6.36±0.06
55	β-Cubebene	1429	1.42±0.01	0.14±	2.65±0.02	-
56	γ-Elemene	1433	-	-	0.83±0.00	-
57	δ-Elemene	1435	0.30±0.00	-	-	-
58	β-Elemene	1451	0.29±0.00	-	-	-
59	α-Humulene	1454	-	-	0.38±0.00	0.85±0.00
60	α-Caryophyllene	1454	0.60±0.00	0.23±0.00	-	-
61	γ-Muurolene	1483	-	-	-	4.33±0.04
62	Bicyclogermacrene	1499	-	-	1.26±0.01	-
63	β-Bisabolene	1501	0.23±0.00	-	-	-
64	α-Bulnesene	1507			-	2.00±0.02
65	γ-Cadinene	1513	0.33±0.00	-	-	1.52±0.01
66	δ-Cadinene	1523	-	-	0.64±0.00	-
67	δ-Cadinene	1524	0.27±0.00	-	-	-
68	(-)-Spathulenol	1572	-	-	0.32±0.00	-
69	Germacrene D-4-ol	1570	0.51±0.00	-	-	-
70	Ledene oxide	1578	-	-	0.45±0.00	-

Table 1 (Continue)
Chemical composition of essential oil of garden thyme, rosemary, spearmint, sweet basil

№	Compounds	RI	Content, %			
			Garden thyme	Rosemary	Spearmint	Sweet basil
71	Caryophyllene oxide	1580	0.47±0.00	0.74±0.00	0.56±0.00	-
72	Germacrene D	1580	-	0.19±0.00	-	-
73	Cubenol<1,10-di-epi->	1618	-	-	0.29±0.00	-
74	*δ*-Cadinol	1619	-	0.66±0.00	0.61±0.00	1.92±0.01
75	*τ*-Cadinol	1634	-	0.73±0.00	0.52±0.00	1.07±0.01
76	*α*-Cadinol	1641	-	0.40±0.00	0.39±0.00	6.53±0.06
77	Phytol	2105	0.29±0.00	-	-	-
78	Squalene	2817	0.32±0.00	-	-	-

*- not identified

The moisture of the rosemary sample was 64.00%±0.60. The yield of essential oil was 1.09%±0.01 (in abs. dry mass was 3.03%±0.03). The oil was light yellow liquid with a characteristic, refreshing, pleasant odor. The oil is composed by 34 components (Table 1) representing 99.00% of the total content. Sixteen of them were in concentrations over 1% and the rest 18 constituents were in concentrations under 1%. It is obvious that the major constituents (up 3%) of the oil were as follows: 1,8-cineole (19.89%), (+)-camphor (16.86%), *α*-pinene (13.37%), camphene (7.22%), borneol (5.27%), *α*-phellandrene (4.27%), *α*-terpineol (4.10%), verbenone (3.69%), and bornyl acetate (3.37%). One of the values of aromatic components in the composition of the essential oil of rosemary is comparable to those obtained by De Mastro et al. [14]. The results indicated that Bulgarian essential oil obtained from *R. officinalis* is from camphor chemotype [19]. The differences in chemical composition were explained with the different extraction methodologies used.

The moisture of the spearmint sample was 84.60%±0.81. The yield of essential oil was 0.83%±0.00 (in abs. dry mass was 5.41%±0.05). The oil was light yellow liquid with a fresh, caraway-minty odor (Table 1). The results show that 40 components representing 98.95% of the total content were identified in the oil. Fourteen of them were in concentrations over 1% and the rest 26 constituents were in concentrations under 1%. It is clear that the major constituents (up 3%) of the oil were as follows: (-) carvone (50.23%) and limonene (13.90%), that qualitative and quantitative results are comparable with that identified from Nikšić et al. [31]. Through aromatic compounds isolated from *M. spicata* in Bulgaria, the carvone/limonene chemotype of the tested sample was established [19].

The moisture content of the sweet basil sample was 88.71%±0.86. The yield of essential oil was 0.19%±0.00 (in abs. dry mass was 1.70%±0.01). The oil was light yellow liquid with typical fresh-spicy odor. Results presented on Table 1 show that the tested oil was consisted of 27 components, representing 98.81% of the total content. Fourteen of them were in concentrations over 1% and the rest 13 constituents were in concentrations under 1%. As seen the major constituents (up 3%) of the oil were as follows: *β*-linalool (30.52%), methylchavicol (13.16%), eugenol (11.74%), 1,8-cineole (8.26%), *α*-cadinol (6.53%), *α*-bergamotene (6.36%), and *γ*-muurolene (4.33%), comparable to results obtained from other researchers [10]. The results indicated that Bulgarian essential oil obtained from sweet basil is a linalool chemo type [19].

The classification of the identified compounds, based on functional groups, is summarized in Figure 1. The predominant participation of oxidized monoterpenes in the essential oil of spearmint, rosemary and sweet basil is established.

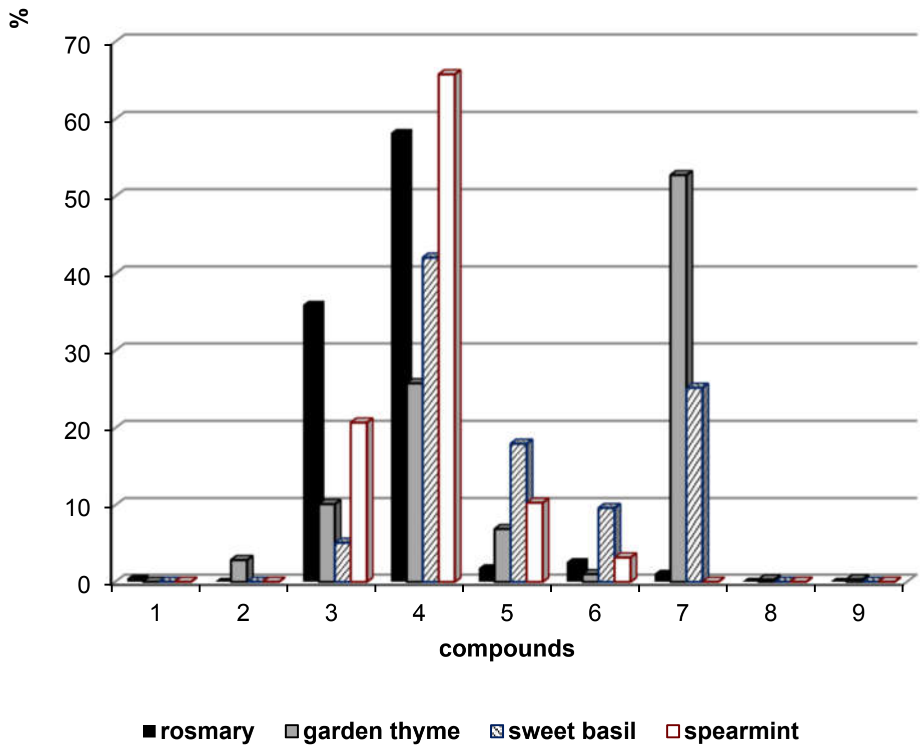

Figure 1. Group of components in essential oils from Lamiaceae, %,:
1-hydrocarbons,
2-oxygenated hydrocarbons,
3-monoterpene hydrocarbons;
4-oxygenated monoterpenes;
5-sesquiterpene hydrocarbons,
6-oxygenated sesquiterpenes,
7-phenylpropanoids;
8-diterpenes;
9-triterpenes.

Two groups of compounds were dominant in rosemary essential oil (Fig. 1), as oxygenated monoterpenes (58.21%) and monoterpene hydrocarbons (35.98%), followed by oxygenated sesquiterpenes (2.56%), sesquiterpene hydrocarbons (1.78%), and phenylpropanoids (1.05%).

Compounds, identified in garden thyme essential oil (Fig. 1) were phenylpropanoids (52.75%), ogygenated monoterpenes (25.78%), monoterpene hydrocarbons (10.14%), sesquiterpene hydrocarbons (6.89%), oxygenated hydrocarbons (2.84%), ogygensesquiterpenes (0.99%), triterpenes (0.32%), and diterpenes (0.29%).

Duke [16] summarized that the major aromatic components derived from the essential oil of *T. vulgaris* were as follows: thymol (23-60%), *γ*-terpinene (18-50%), p-cymene (8-44%) carvacrol (2-8%), and linalool (3-4%). The reason for the different results may be caused by the origin of the sample, environmental differences, age of the plant, dissimilarities in method of isolation and seasonality.

Oxygenated monoterpenes (42.09%), phenylpropanoids (25.20%), and sesquiterpene hydrocarbons (17.98%) were the dominant group in sweet basil essential oil (Fig. 1), followed by oxygenated sesquiterpenes (9.63%), and oxygenated hydrocarbons (5.10%).

Oxygenated monoterpenes (65.80%) were the dominant group in spearmint essential oil, followed by monoterpene hydrocarbons (20.71%), sesquiterpene hydrocarbons (10.32%), and phenylpropanoids (3.17%).

The differences in the quantitative and qualitative composition of essential oils of garden thyme, rosemary, spearmint and sweet basil and their aromatic components in relation to the previous researches may be probably due to different environmental and genetic factors, different chemotypes and the nutritional status of the plants as well as other factors that can influence the oil composition.

Antibacterial activity

The results of antibacterial testing are presented in Table 2.

All essential oils showed good antibacterial potential against tested four strains of foodborne pathogens. *E.coli* was the most susceptible bacterium strain. The essential oils of spearmint and rosemary possessed the most pronounced antibacterial activities against *E. coli* (with inhibition zone: 32.00 mm and 30.00 mm). Garden thyme was most effective against *E. coli* due to the two major constituents as thymol and carvacrol, because of their ability to break the outer membrane of Gram-negative bacteria and increase the permeability of the cytoplasmic membrane. On the other hand, the essential oil of sweet basil showed highest antibacterial property against *S. enterica* owing to the presence of the major compound linalool.

The weakest potential was observed by the spearmint oil against *S. enterica.* All these spices, widely used in culinary technology contain compounds that have been shown to possess antibacterial functions. Studies have shown that constituents with a phenolic structure in essential oils, such as eugenol, carvacrol and thymol have the greatest antibacterial activities, followed by aldehydes, ketones, alcohols, ethers and hydrocarbons [39, 24].

Table 2

Diameter of zones of growth inhibition (mm) of tested pathogenic bacteria

Bacteria / Sample	***E. coli* ATCC 8739**	***S. enterica* NCTC 6017**	***L. monocytogenes* NCTC 11994**	***S. aureus* ATCC 25093**
	Zones of growth inhibition (mm)			
Garden thyme	21.01±0.20	12.02±0.11	19.01±0.18	20.03±0.19
Rosemary	30.04±0.28	11.01±0.10	13.02±0.12	11.01±0.10
Spearmint	32.00±0.30	12.00±0.11	6.00±0.05	11.02±0.10
Sweet basil	17.01±0.16	20.03±0.19	7.02±0.06	15.02±0.14

Our results for garden thyme were in agreement with the findings of El Hattabi et al. [17].

The results of the antibacterial activity of the spearmint essential oil were lower than the findings of Horváth and Koščová [23] reported the highest antibacterial properties against *S. aureus* CCM 4223 with inhibition zone varied at a range of 35.67 mm. The results obtained in this study are comparable to the findings of Moghaddam et al. [30, 37] reported that sweet basil essenatial oil showed inhibition zones against *S. aureus* (29.20–30.56 mm), and *E. coli* (17.48-23.58 mm).

Differences in the geographic environment, the cultivar type, age of the plant, different methods of isolation, and seasonality of the samples could be the reasons for the obtained differences in spectrum of antibacterial activity.

Conclusion

In the present study the aromatic composition and antibacterial properties of essential oils of thyme, rosemary, spearmint, and sweet basil were investigated. The results show the presence of alcohols and ketones in the aromatic composition of the essential oil. The identified aromatic compounds exhibit antimicrobial properties against foodborne pathogens. The essential oil of garden thyme possessed the strongest antimicrobial activity against *S. aureus* and *L. monocytogenes.* Otherwise, essential oil of sweet basil showed most pronounced antimicrobial properties against *S. enterica*, while *E. coli* was most susceptible to the essential oil of spearmint and rosemary. The results obtained provide a basis for a thorough examination of the chemical composition and antimicrobial properties of various representatives of Lamiaceae family with a view to a wide usage in food technology.

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