

DOI: <https://doi.org/10.52756/ijerr.2021.v24.003>

## **The practical and potential importance of herbs such as ginger in Chemical Environmental Science**

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### **Abstract**

This article examines the medicinal and dietary supplement on the biological activities of identified chemicals from Ginger (*Zingiber officinale*) of Zingibraceae family. Ginger have long been used in traditional medicine. One of the plants that is very effective in extracting essential oils is ginger, which has been studied by researchers in agricultural sciences and chemistry. The use of medicinal plants has a long history and one It has been one of the most important sources for overcoming the disease. Then From the creation of modern medicine and the widespread use of drugs chemically, people's tendency to medicinal plants decreased. Ginger plants are used, which can lead to the development and progress of countries. Ginger is a rhizome plant that grows to a height of 90cm centimeters.

**Keywords:** Environment, industry, ginger, medicinal essential oils.

### **Introduction**

Essential oils are variety of chemical compounds that are mainly produced by plants. Today, these compounds are widely used in human life for example. These compounds are widely used in the perfumery, cosmetics and fragrance industries and in the food industry as a fragrance. Many essential oils have also remarkable beneficial medicinal effects and are used in the treatment and control of diseases (Omidbeighi, 2007).

In this study, the climatic conditions and medicinal plants, including ginger, have been studied. This alone is more than twice the vegetation diversity of the whole continent of Europe. Essential herbs and medicinal plants

have a great share and different species of them are found in different parts of the country (Zargari, 1992). Unfortunately, the production and operation of them is currently very poor compared to country's potential. In addition, except in a handful of cases, their exploitation is quite traditional and unscientific, which in addition to damaging the country's natural vegetation, does not produce good economic returns for country. One of the most important reasons for the unstable situation of production and exploitation of plants in Iran is the lack of sufficient information about them. There are many medicinal herbs in the country that despite their essential oils and beneficial

substances are useful in terms of medicines, nutrition, cosmetics and so on. In some cases their herbs are completely unknown and except for a brief morphological name and information, there is no other information about them (Erfani, 2018). Essential oil is a volatile compound that has a set of terpenes. Essential oils and other plant aromatic substances are extracted in various ways such as cold pressure extraction, distillation, solvent extraction, vacuum distillation by microwave, soaking and extraction of absorbent oils from plant materials. The extracted products are commonly called total extract and are not called essential oils. The essence of the oil is used only for distilled oils. Essential oils are one of the active ingredients in plants. Essential oils are not homogeneous in chemical composition but are found in different compositions but are generally of the chemical group known as terpenes or have a terpene origin. One of the most important issues of medicinal plants is the study of the essential oils of different organs of a plant and their comparison in terms of quality and quantity. Because of their plant origin, the essential oils have been widely used in the production and production of plants, which has led to the cultivation of plants that have been economically important (Mozaffari et al., 2015).

Ginger is one of the oldest known medicinal plants by humans. Ginger is a native plant that grows in tropical areas with high humidity in Southeast Asia or India. It is not cultivated in Iran. The main constituents of ginger include starch, essential oils that give ginger a special smell zingiberen and resin. Ginger properties include numerous nausea and heartburn, anti-clotting, antibacterial, antioxidant, anti-cough, anti-liver toxins, anti-inflammatory, diuretic, stimulant and reducing spasm and immune

stimulants, anti-flatulence and increased intestinal secretions. Gastric lowering blood cholesterol and stimulates digestion (Mozaffari et al., 2015).

The purpose of this study was to evaluate and compare the chemical constituents of ginger essential oils as well as their activities in future research in the pharmaceutical and other environment sciences, to optimize the use of the essential oils and their compounds and to replace them with chemical drugs.

### **Material and Methods**

In this article, I have tried to analyze the plant using the GCMS machine and have prepared the data in an excel file. Results of ginger essential oil are provided by GCMS. Compounds were identified using various parameters such as inhibition index and other factors that are well known. The essential oils were analyzed by GCMS, which finally have identified 53 different compounds for ginger essential oil (Iran agricultural database, 1998).

### **Result and discussion**

The essential oil extraction process of each plant was performed by water distillation using Clevenger apparatus. GC-MS Identification of compounds in essential oils and quantitative measurement of each of them were performed using devices, respectively. Essential oils obtained by devices GC-MS Were analyzed and finally 53 compounds were identified for essential oils which is quite clear based on the charts (Azarnia et al., 2015). These compounds have some medicinal properties such as antidiabetic, therapeutic properties, antioxidative, and antimicrobial activities. Therefore, ginger with food products could help to provide for functional dairy products, herbal medicine, fertilizer with nutritional and medicinal values.

**Table 1. Name and percentage of constituents of ginger essential oil under GCMS analysis.**

No	Cn	Cn+1	Tn	Sn	Sn+1	RI	Code 5	(%)	Adams (RI)
1	9	10	9.42	8.47	10.98	938	alpha-Pinene	0.3	932
2	9	10	9.82	8.47	10.98	954	Camphene	1.3	946
3	9	10	10.68	8.47	10.98	988	Myrcene	0.2	988
4	10	11	11.9	10.98	13.78	1033	beta-Phellandrene	3.9	1025
5	10	11	13.68	10.98	13.78	1096	Linalool	0.2	1095
6	11	12	15.8	13.78	16.63	1171	Borneol	0.9	1165
7	11	12	16.43	13.78	16.63	1193	alpha-Terpineol	0.3	1186
8	12	13	17.71	16.63	19.41	1239	Neral	0.8	1235
9	12	13	18.49	16.63	19.41	1267	Geranial	1.1	1264
10	12	13	19.09	16.63	19.41	1288	Bomyl acetate	0.8	1284
11	13	14	20.66	19.41	22.1	1346	Citronellyl acetate	0.2	1350
12	13	14	21.45	19.41	22.1	1376	Neryl acetate	2.7	1359
13	13	14	21.72	19.41	22.1	1386	alpha-Copaene	0.6	1374
14	14	15	22.06	22.1	24.63	1398	beta-Elemene	1.3	1389
15	14	15	22.27	22.1	24.63	1407	7-epi-Sesquithujene	0.4	1390
16	14	15	23.11	22.1	24.63	1440	gamma-Elemene	0.5	1434
17	14	15	23.47	22.1	24.63	1454	(E)-beta-Farnesene	0.6	1454
18	14	15	23.61	22.1	24.63	1460	Sesquisabinene	0.6	1457
19	14	15	24.01	22.1	24.63	1475	9-epi-(E)-Caryophyllene	0.3	1464
20	14	15	24.32	22.1	24.63	1488	ar-Curcumene	12.3	1479
21	14	15	24.49	22.1	24.63	1494	Germacrene D	1.9	1484
22	15	16	24.65	24.63	27.04	1501	alpha-Zingiberene	12.6	1493
23	15	16	24.79	24.63	27.04	1507	(E,E)-alpha-Farnesene	7.6	1505
24	15	16	24.97	24.63	27.04	1514	beta-Bisabolene	10.0	1504
25	15	16	25.38	24.63	27.04	1531	beta-Sesquihellandrene	13.8	1521
26	15	16	25.6	24.63	27.04	1540	Italicene ether	0.2	1536
27	15	16	26.02	24.63	27.04	1558	Elemol	1.9	1548
28	15	16	26.13	24.63	27.04	1562	(E)-Nerolidol	0.8	1561
29	15	16	26.42	24.63	27.04	1574	Germacrene D-4-ol	0.2	1574
30	15	16	26.92	24.63	27.04	1595	trans-Sesquisabinene hydrate	1.4	1577
31	16	17	27.32	27.04	29.33	1612	5-epi-7-epialpha-Eudesmol	0.5	1607
32	16	17	27.47	27.04	29.33	1619	epi-Cedrol	2.5	1618
33	16	17	27.85	27.04	29.33	1635	2-epialpha-Cedren-3-one	2.3	1626
34	16	17	28.05	27.04	29.33	1644	allo-Aromadendrene epoxide	1.2	1639
35	16	17	28.27	27.04	29.33	1654	Himachalol	0.2	1652
36	16	17	28.58	27.04	29.33	1667	7-epialpha-Eudesmol	1.8	1662
37	16	17	28.8	27.04	29.33	1677	Intermedeol	0.6	1665
38	16	17	29.24	27.04	29.33	1696	alpha-Bisabolol	2.4	1685
39	17	18	29.42	29.33	31.45	1704	8-Cedren-13-ol	1.5	1688
40	17	18	29.66	29.33	31.45	1716		0.1	
41	17	18	29.8	29.33	31.45	1722	Longifolol	0.4	1713
42	17	18	30.08	29.33	31.45	1735	(E)-Nuciferal	0.5	1727
43	17	18	30.46	29.33	31.45	1753	Xanthorrhizol	0.6	1751
44	17	18	30.94	29.33	31.45	1776	gamma-Curcumen-15-al	0.2	1766
45	17	18	31.09	29.33	31.45	1783		0.1	
46	17	18	31.24	29.33	31.45	1790	12-hydroxy-(Z)-Sesquicineole	1.4	1766
47	18	19	31.8	31.45	33.55	1817	(E)-Apritone	2.6	1708
48	18	19	32.26	31.45	33.55	1839	(2Z,6E)-Farnesyl acetate	0.2	1821
49	18	19	33.15	31.45	33.55	1881	(Z)-Lanceol acetate	0.1	1854
50	18	19	33.24	31.45	33.55	1885		0.4	
51	19	20	34.84	33.55	35.58	1964		0.2	
52	20	21	36.42	35.58	37.54	2043		0.1	
53	21	22	38.81	37.54	39.62	2161	Geranyl linalool isomer	0.2	
								99.94	

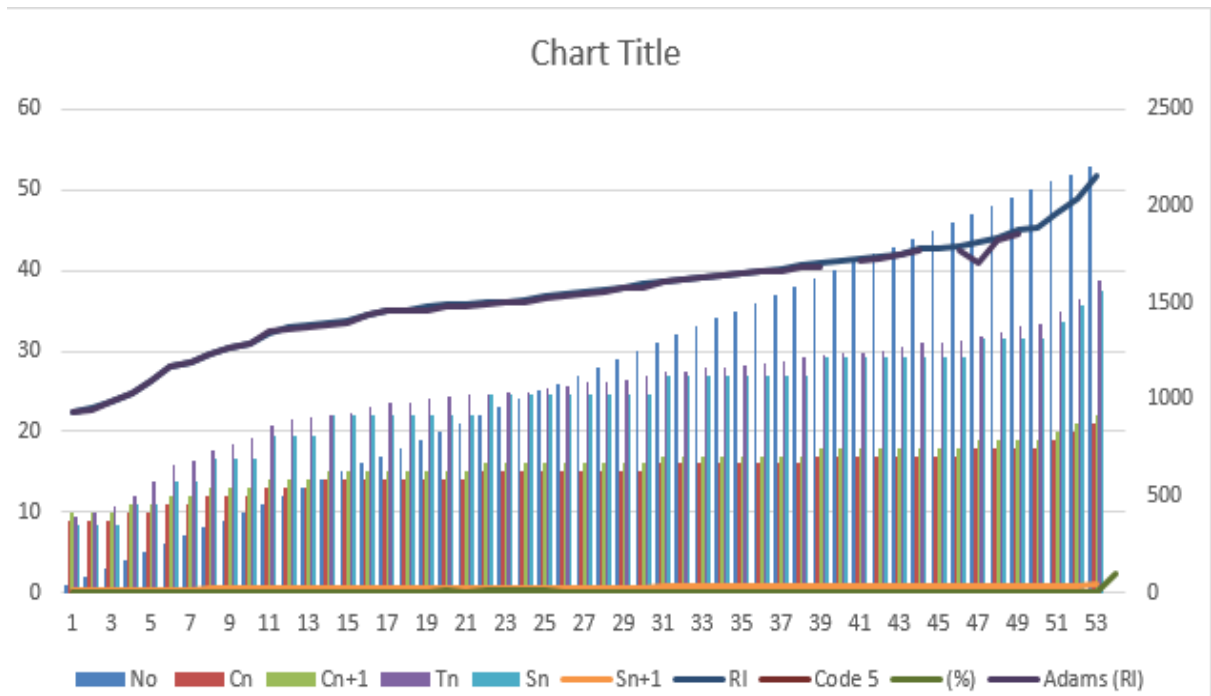


Figure 1. Material analysis chart of constituents of ginger essential oil with its percentage.

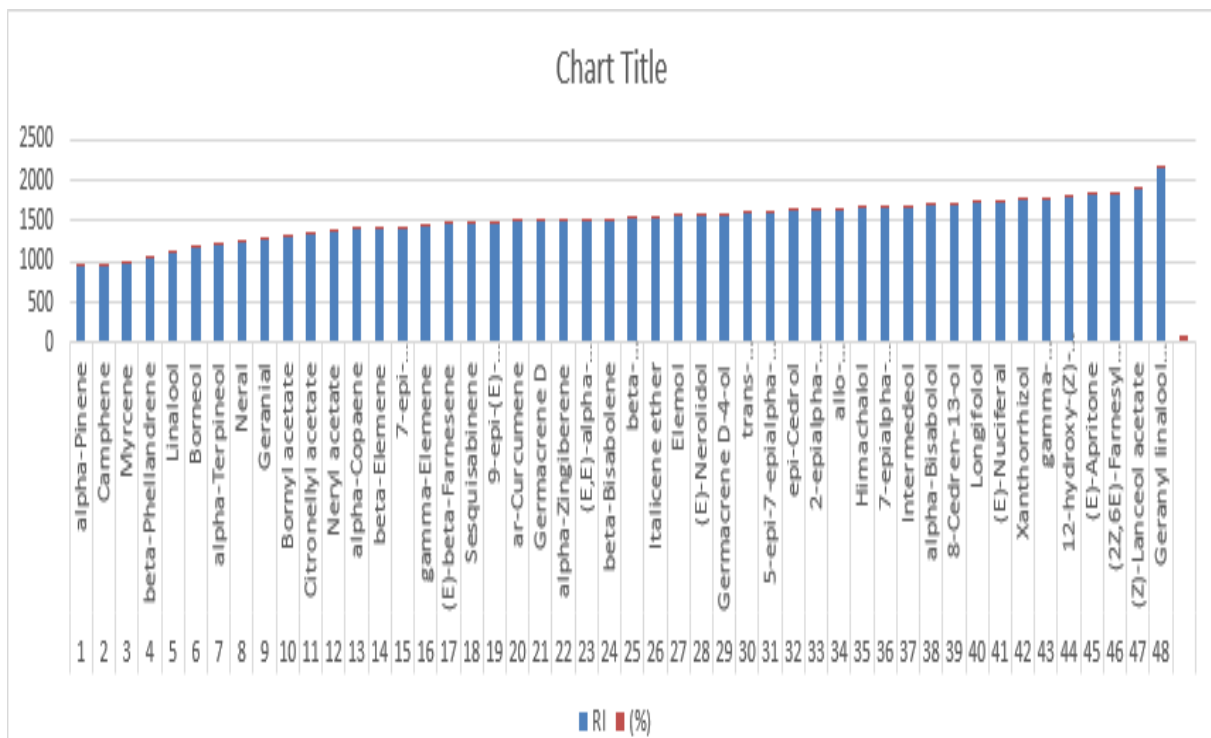


Figure 2. Name and percentages of ingredients of ginger essential oil.

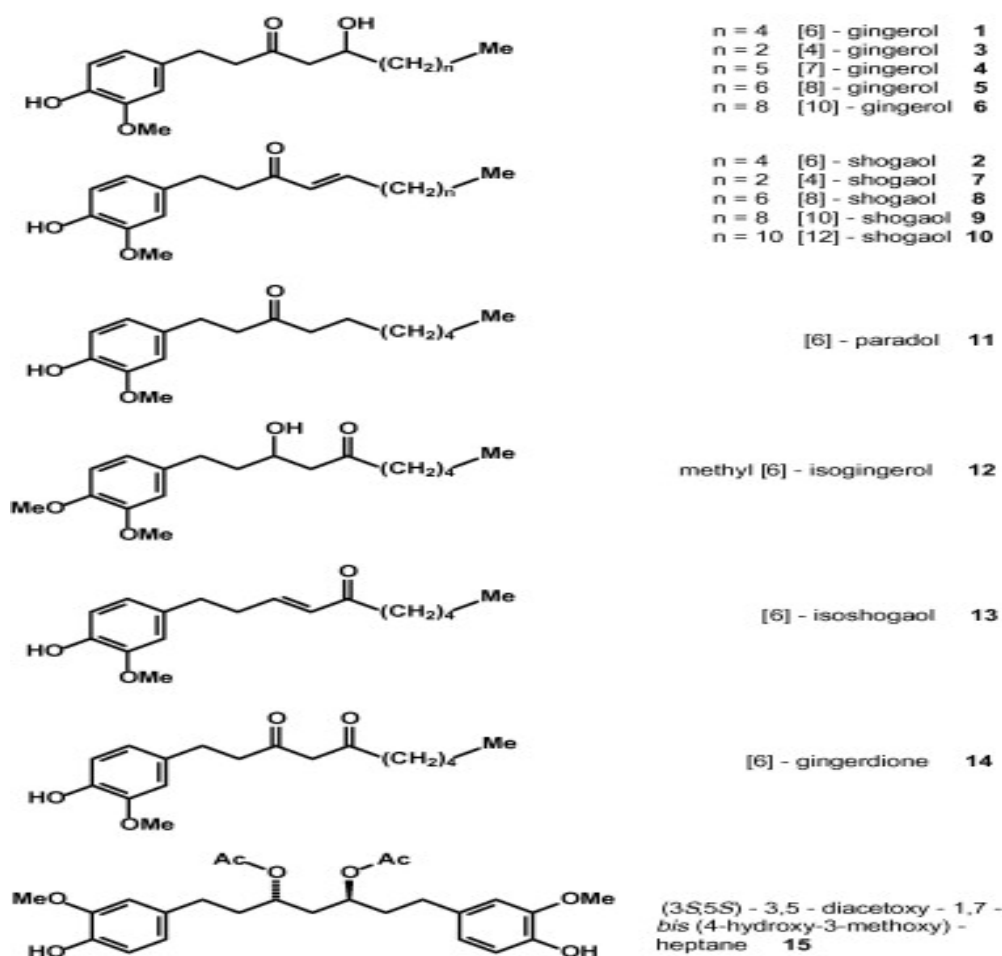


Figure 3. Chemical compounds of ginger (Bardlin et al., 2008).

### Conclusion

Since ancient period ginger and its essential oil is used for its pharmacological and its dietary supplement on the biological activities. There are 53 biologically active components are reported under my GCMS studies which are basically flavonoids, alkaloids, tannins, terpenoids etc. Due to the presence of important pharmacological properties, it should be raise to awareness for the ginger plants in near future. Fertilizer management is an important factor in the success of cultivation of this ginger medicinal plants and in the meantime, identifying fertilizers that are compatible with nature and suitable for the plant can have favorable effects on quantitative and qualitative

indicators of the plant. It seems that biological fertilizers can be used in sustainable agriculture as an alternative to chemical fertilizers in the medicinal plant ginger. So the ginger intends to emphasize on the traditional use for house-hold treatment and therapeutic usefulness of this valuable medicinal plant.

### Conflict of interest

Authors declare that there is no conflict of interest.

### References

Azarnia, M., Mohsen, A., Saeed, S. and Abas, B. (2015). The effect of bio- fertilizers on crop yield sustainable agriculture

- and organic farming. *Journal of Biosafety*. 8(2): 20-30.
- Bardlin, H. A., Blunden, G., Tanira, M. O. and Nemmar, A. (2008). Some phytochemical, pharmacological and toxicological properties of ginger (*Zingiber officinal Roscoe*): A review of recent research. *Food and Chemical Toxicology*. 46: 409-420.
- Erfani, H. (2018). Essential Technology, Saravan Press, Iran. Vol. 1. Pp. 27-32.
- Iran Agricultural Database. (1998). Ministry of Agriculture, Office of Statistics and Information. Vol. 1. Pp. 15-35.
- Mozaffari, P., Hadi, E., Gholamreza, A., Javad, H. and Davood, H. (2015). Investigating the effect of biological fertilizers on quantitative and qualitative yield of ginger in the green house, National Congress on herbal drug and National seminar on medicinal and aromatic plants, Shahrekord, Iran.
- Omidbeighi, R. (2007). Medicinal plants production and processing approaches, Razavi Publications, Iran. Vol. 1. Pp. 36-42.
- Zargari, A. (1992). Medicinal plants, University of Tehran publications, Iran. Vol. 1. Pp. 39-45.