University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2025) PP 516-522

https://jam.utq.edu.iq/index.php/main

The aqueous extract of the sage plant leaves

Sabaa O. Albalawi[1] Hala. A. Shaheed[2] , Shirin S. Al-Shewaili[3]

[1*2*3] Department of Soil Science and Water Resources, College of Agriculture and Marshes, University of Thi-Qar – Iraq.

[1]*E-mail: Sabaa.auda@utq.edu.iq*
[2]*E-mail: halaadnan@utq.edu.iq*
[3]*E-mail: shirinsamir@utq.edu.iq*

Abstract

sage leaves were brought from local markets, the leaves were washed thoroughly and then dried well under the sun for three days, turning them continuous from time to time to prevent rotting, the leaves were then ground using an electric grinder (Morter) and the powder was stored in clean plastic bags at room temperature until use, the aqueous abstract was Prepare according to the method of Hernandes et al. (1994), which involves mixing a quantity of dried sage leaf powder with a quantity of distilled water in a ratio of 1 g: 2 ml of distilled water by placing it in a water bath at 60 °C for one hour, the solution was then left to stand for 24 hours at room temperature, after which the resulting mixture was filtered through several layers of sterile gauze; the concentrated liquid was then ready.

Keywords: saga, Flavonoids, Tannin

I. Introduction

saga is the largest genus in the mint family Lamiaceae , which includes about 900 species distributed worldwide, some of which are economically important (B. Bozin, 2007) sage is considered a medicinal plant, as it has been widely used in traditional medicine for many centuries. Many researches have been conducted to determine the effective compounds it contains in addition to its therapeutic effect (Baricevic, 2000). saga was first discovered in Mediterranean countries in the north and eventually spread to England, France and Switzerland in the14th century (Krutch, 1965). sage is primarily used in cooking as a spice to enhance the flavor of lamb, meat and sausages. It is also used in pickles and salads. sage is used in the manufacture of cosmetics, beverages, perfumes and pharmaceutical industries (Grieve, 2008) sage is characterized by having biological activities that include antibacterial anti-inflammatory antioxidant, antiviral and antifungal properties. sage essential oil has been used to treat a wide range of diseases such as the nervous system, heart, and circulation systems, respiratory and digestive systems, and endocrine diseases (Mayer, 2009).

Literature Review

Scientific classification of the sage plant

Kingdom: plantae
Trachllophytin: Division

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2025) PP 516-522

https://jam.utq.edu.iq/index.php/main

Phylum: Euphyllophyte
Order: Lamiaceae
Family: Loganiaceae
Genus: Salvia
Species: officiates

(2010 ،al oudaat)

Botanical description of sage

It is a small perennial herbaceous plant (figure. 1), rising approximately 30 cm, above the ground. The leaves of the sage plant are usually longer than the width. The length of the leaf is about (2-4) cm in length and is about half width (Sutton and John, 2004), sage (Salvia officinalis L.) is an aromatic plant belonging to the Lamiaceae family The salvia genus includes about 600 species. It is an evergreen shrub with woody stems and gray leaves covered with a thin layer of down. Its flowers are blue with a hint of purple (Alhakim,2008). After that, it turns into a fruit resembling a cherry. In the case of dryness, its color changes to become white. The sage plant grows in alkaline soils, and the flowers and leaves of sage are edible. Its leaves, which have a strong aromatic scent, are used in cooking. The leaves and flowers can be eaten raw, cooked, pickled, or added to sandwiches. Or scatter the flowers on salads to add color and fragrance, in addition to making herbal tea from Fresh or dried sage leaves; this is believed to aid digestion. The oil extracted from this herb is also used to flavor ice creams and sweets. The main components of sage oil are. Cineol, Myrcene, Beta-Pinene, Thujone-Pinene, Alpha-Pinene, Borneol, Caryophyl (Alizadeh and Shabaani, 2012).

Figure (1) sage plant

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2025) PP 516-522

https://jam.utq.edu.iq/index.php/main

II. A brief history

Medicinal plants have been used for centuries due to their antibacterial properties as well as antioxidants, antifungals and antifungals (Glisic, 2010). As a result, these plants have Garnered significant inttention as an alternative nutrition strategy to replace stimulants and antibiotics (Baricevic, 2000). The sage is a medicinal plant belonging to the mint family and originates from the Mediterranean countries (Dweck, 2000). Therefore, because of their antioxidant properties, it has the ability to activate oxidative enzymes, and the oils found in the sage plant can be used as supplements to poultry feed in order to prevent or delay oxygen free radicals in broiler chickens (Ryzner, 2013) Sage was first found in Mediterranean countries and later spread to England, then France and Switzerland in the fourteenth century (Krutch, 1965). Sage is the most famous and oldest plant used in ancient and modern medicine. This plant is found in the Mediterranean basin. It is often found in mountainous areas and undeveloped lands, especially in areas between mountains and rocky terrain. In places it is locally called (al-Rumyan) and in other places it is called the shrub (Erats, 2005). The 17th-century scholar Gerrard noted that sage strengthens and quickly restores a weak memory. Other active compounds in sage include oxymine, cineole, limonene, and terpenes, most of which compounds act as an antioxidant, and can kill many types of bacteria (Vichi et al., 2001)

Health and medicinal benefits of the sage plant

The aqueous or abstract infusion of sage leaves is used to relieve throat and gums pain when used as a mouthwash, and as a drink to relieve coughs, strengthen and stimulate blood circulation, and reduce nervous agitation. It calms the nerves, stops diarrhea, and increases bile secretion. The herb may also be used to treat stomach disorders, regulate digestion, or relieve kidney pain and urinary retention. The volatile oil is used as a disinfectant or as a treatment for some skin diseases. The volatile oil as a whole relieves muscle spasms and is antibacterial (Al-Sayed, Muhammad Darwish, 2004), Sage helps to promote brain health and memory; it is rich in many compounds that act as antioxidants, which create a good environment for maintaining brain health, in addition to its role in inhibiting the breakdown of the chemical messenger Acetylcholine, which is important for memory, and whose levels decrease in people with Alzheimer's disease (Andrew Scholey, Nicola Tildesley, Clive Ballard And Others (2008)). The aqueous extract of sage reduces pain in the somatic sensory system and possesses anti-inflammatory properties (Mir Nouri, Ali Abbas Abad, and Farzaneh Tavakkoli, 2011). Consuming crude sage extract has been found to alleviate diarrhea due to its anti-diarrheal properties and antispasmodic effects, which may be beneficial for cramps and spasms. In the digestive system (Aslam Khan, Najeeb-ur-Rehman, Khalid M. AlKharfy, and others (2011)), there has recently been a trend towards using medicinal plants in animals due to their active compounds that improve productive traits. Sage is considered one of the most widely used medicinal plants in traditional medicine, and it has been used to treat many diseases, such as lung and intestinal inflammations and dizziness. It treats rheumatism, obesity, and bleeding gums. (Al-Arqawi, 2009; 2017, Esmaeil Zadeh and Ghorbani). Women in Egypt also used it to increase their fertility and as an antidote for snake bites. This plant has been used to treat diarrhea and high blood sugar and has antibacterial properties (Ghorbani and Esmaeil Zadeh, 2017).(

Chemical analysis of the sage plant

The most potent components of sage are found in its essential oil (1-8.2%), including β-monoterpenes, β-thujone, camphor, cineole, borneol, and, in larger quantities, β-humulene and β-caryophyllene. The leaf also contains di- and triterpenes. Other components of the herb that contribute to its antioxidant effect are phenolic acids (caffeic, chlorogenic, rosmarinic, and ferulic) and flavonoids (Schoenfelder, 2001; Mathe, I.; Hohmann, J.; Janicsa, 2007). The chemical composition of the sage plant has been examined in various countries (Mockute, 1990, Tucker, 1990), and the essential oils have been divided into five groups according to the quantity of the main constituents: 1. 1,8-cineole 3. β-thujone <camphor> 2. 1,8-cineole <camphor> 4. 1,8-cineole <camphor> 5. β-thujone <camphor> 5. β-thujone <camphor> Other authors have mentioned alcohol-sesquiterpene (viridiflorol) as one of the five main constituents (Santos-Gomes, 2001). The chemical composition of common sage describes Ma-, Cineole 4.5-24.5%; 1,8-Camphor R-Thujone, 18.0-43.0%;

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2025) PP 516-522

https://jam.utq.edu.iq/index.php/main

β-Thujone, 3.0-8.5%; β-Limone 1.5-7.0%; Camphene 1.0-6.5%; Pinene 0-12%; R-, Humulin 5.5-13.0%; Bornyl acetate <2.5%; Linalool 0.5-3.0% (ISO, 1997)

Active compounds of the sage plant

Glycosides, flavonoids, tannins, saponins, resins, phenols, alkaloids, terpenes, carbohydrates, steroids, and philopatries have been identified (Muhammed, 2007). The most important active compounds in the sage plant are flavonoids, terpenes, quinones, sulfites, polyphenolics, carotenoids, and saponins. (Carig, 1999) It also contains a volatile oil, comprising up to 2%, mainly thujone, cineole, and various other organic acids, tannins, Rosmarinus acid, and estrogens, including picowaving. The active compounds in these plants have broad and varied effects on poultry health. (These plants contain antibacterial, antiviral and antioxidant properties, and the essential oils of sage can be considered a source of antioxidants that can be used as poultry feed supplements to prevent or delay the formation of oxygen free radicals in broiler chickens (Ryzner, 2013).Sage is characterized by its biological activities, which include antibacterial, anti-inflammatory, antioxidant, antiviral, and antifungal properties (perhaps due to the active ingredients in sage, such as flavonoids and other compounds with a structure and action similar to steroid hormones and saponins). The glycosides stimulate the secretion of sex hormones, as estrogen converts the calcium stored in the bone marrow into the blood to supply the uterus with the calcium it needs to form the cortex. (The part of the plant used is...) The leaves of the sage plant are collected when the plant begins to flower, as these leaves contain oils that reach 5.2% or more. The oil is yellow-green and contains linalool. In addition, the leaves contain bitter substances, tannins, and resins (Al-Zubaidi, Labib Ahmed Kazem, 2005).

Flavonoids

Flavonoids are a large family of phenolic compounds produced by the plant, containing more than 60,000 species, having a common chemical structure in which the carbon structure consists of 15 carbon atoms (C6-C3-C6) distributed over two hexagonal aromatic rings (ring A and B) associated with a heterogeneous ring pyrane or pyrone and called ring C (Ben Salma, 2012) In nature, flavonoid compounds are products extracted from plants and are found in several parts of the plant. Vegetables use flavonoids for their growth and Defence against platelets (Havsteen B, 2002). Many flavonoids are easily recognised as flower pigments in most seed cassid families. However, its occurrence is not limited to flowers, but it is found in all parts of plants (Dewick, 2001) Flavonoids that contribute to the formation of coloured dyes for fruits, herbs, vegetables and medicinal plants (Dixon R & Pasinetti G 2010). One of these plants is thesage plant and the mirmia has many antioxidant and bacterial properties; because it contains flavonoids) and some polyphenol compounds, as the majority of phenolic acids in the sage plant, and has a major role in the biochemical processes of the oral family plants (↑ (Mohsen Hamidpour, Rafie Hamidpour, Soheila Hamidpour, and others 2014)) Flavonoids protect plants from various vital and non-biotic stresses and act as filters Unique UV. (Takahashi A & Ohnishi T, 2004) Flavonoids have many functions and roles in the plant, including protection against ultraviolet rays (UV) and against oxidation, Defence against pathogens, and can also control the activity of hormones responsible for growth such as oxins, and also their importance in colouring flowers and fruits, in flowers it is about giving the distinctive colour that serves as an auxiliary factor in bringing various plant pollinators as well as antifungal, microbial and insect effects

Tannin

They are phenolic polyces, found in almost every part of the plant, wood, Leaves, shell and roots, and in eruits and fruits (Grapes, Dates, Coffee and cocoa), and THEIR MOLECULAR WEIGHT IS up to 30,000-500 DALTONS, TANNINS HAVE THE PROPERTY of BINDING PROTEINS for A COMPLEX PROBLEM, WHICH LEADS to THEIR DEPOSITION (Kanoun 2012) and THEY are also ARINGENTS, and are also CHARACTERISED by BEING WATER-SOLUBLE SUBSTANCES. (2014, Boukri) Plants Are Rich In Tannins, And They Are Used To Tighten Soft Tissues, Reduce Excess Secretions And Repair Damaged Tissues (2014, Boukri) And Are Also Responsible for the Stinginging Taste Of Immature Fruits (2012), Medical Uses of Tannins Resulting From Their Union with Protein Substances Occur Astringent Effect, So They Are Used in the Treatment of Diarrhoea for Its Astringentingent Effect,

University of Thi-Qar Journal of agricultural research

Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2025) PP 516-522

https://jam.utq.edu.iq/index.php/main

Vasoconstrictor and Reducing Fluid Loss, And It Is Also Used in Superficial Wounds and Burns and Works to Stop the Bleeding for Its Astringent Effect In Addition To Its Antiseptic Effect. (2014, Boukri;) In addition to these properties, tannins have great antioxidant potential due to their phenol nuclei, decomposed and accumulated tannins (condenses et taninshydrolysables) are 15 to 30 times more effective than simple phenols

.Table (1) Percentages of chemical components of sage leaves before and after aqueous extraction

Flavonoids	Alkaloids	Saponin	Oxalate	Tannin	Phytate	Phenol	The active substance
2.97	1.62	4.98	3.17	1.02	0.98	3.47	**(%) Before the extraction**
0.49	0.94	3.77	2.05	0.61	0.53	2.18	**(%) After the extraction**

The analyses were conducted in the laboratories of the Ministry of Science and Technology in Baghdad.

III. Reference

Sutton, John (2004). The Gardener's Guide to Growing Salvias. Workman Publishing Company. P. 17. ISBN 978-0-88192-671-2.

ALHAKIM,W. Medicinal and aromatic plants. Damascus university publications. 2008,100

ALIZADEH, A & SHAABANI, M. Essential oil composition, Phenolic content, Antioxidant and Antimicrobial activity in Salvia officinalis L. cultivated in Iran. Environmental Biology6(1),2012,221-226

Glisic, S., J. Ivanovic, M. Ristic, D. Skala, Extraction of sage (Salvia officinalis L.) by Supercritical CO2: kinetic data, chemical composition and selectivity of diterpenes, Journal of Supercritical fluids 52(2010) 62-70

Baricevic D, Bartol T. The biological/pharmacological activity of the Salvia genus V Pharmacology. In: Kintzios SE, editor. Sage: the genus Salvia. Abingdon, Marston: Harwood Academic Publishers; 2000. p. 143–84.

Dweck, AC., 2000. The folklore and cosmetic use of various Salvia species. In Kintzios SE (Ed.), SAGE – The Genus Salvia, Harwood Academic Publishers Amsterdam.

Ryzner, M., J. Takáčová, K. Čobanová, I. Plachá, K. Venglovská and Š. Faix 2013 Effect of dietary Salvia officinalis essential oil and sodium selenite sup.

Krutch, Joseph Wood, Herbal. G.P. Putnam's Sons: New York, 1965, 222.

Erats, O.N., Guler, T., Ciftici, M., Dalkilic, B., 2005. The effect of an essential oil mixed derived from oregano, clove and anise on broiler performance. I. J. Poultry. Science., 4 (11) 879-884.

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2025) PP 516-522

https://jam.utq.edu.iq/index.php/main

Vichi, S., Zitterl, K., Jugl, M. and Franz, C. 2001. Determination of the presence of antioxidants deriving from Sage and oregano extract added to animal fat by means of assessment of the radical scavenging capacity By photo chemiluminescence analysis. Nahrung ,45(2): 101-104

Adrian L. Lopresti (25-11-2016), "Salvia (Sage): A Review of its Potential Cognitive-Enhancing and Protective Effects", Drugs in R&D, Issue 1, Folder 17, Page 53-64. Edited

Mohsen Hamidpour, Rafie Hamidpour, Soheila Hamidpour, and others (2014)

Andrew Scholey, Nicola Tildesley, Clive Ballard and Others (5-2008), "An extract of Salvia (sage) with anticholinesterase properties improves memory and attention in healthy older volunteers", Psychopharmacology, Issue 1, Folder 198, Page 127–139. Edited.

Mir Nouri, Ali Abbas Abad and Farzaneh Tavakkoli (9-2011), "Effect of Salvia officinalis Hydroalcoholic Extract on Vincristine-induced Neuropathy in Mice", Chinese Journal of Natural Medicines, Issue 5, Folder 9, Page 354-358. Edited

Aslam Khan, Najeeb-ur- Rehman, Khalid M. AlKharfy, and others (2011), "Antidiarrheal and antispasmodic activities of Salvia officinalis are mediated through activation of K+ channels", Bangladesh Journal of Pharmacology, Issue 2, Folder 6, Page 111-116. Edited

Scho¨nfelder, I.; Scho¨nfelder, P. Der neue Kosmos Heilpflanzen F::uhrer; Franckh-KosmosVerlags: Stuttgart, Germany, 2001; p 286

Ma´the´, I.; Hohmann, J.; Janicsa´k, G.; Nagy, G.; Re´dei, D. Chemical Diversity of the biological active ingredients of Salvia officinalis and Some closely related species. Acta Pharm. Hungarica 2007, 77, 37–43.

Tucker, A. O.; Marciarello, M. J. Essential oils of cultivars of Dalmatian sage (Salvia officinalis L.). J. Essent. Oil Res. 1990, 2, .144–139

Mockute´, D.; Nivinskiene´, O.; Bernotiene´, G.; Butkiene´, R. The cis-Thujone chemotype of Salvia officinalis L. essential oils. Chemija .219–216 ,14 ,1990

Muhammed: Eman Hussam, Extractions of some Active Compounds from Capparis and Study of its Antibacterial Activities Anbar University, (2007).

Carig, W.J. 1999. Health promoting Herbs. An. J. Nutr. 70, 491-499

Nguyen,C.2000. Antimicrobial. Del compo, J. Amiot, M.J. and Effect Of rosemary extract. J. food Protection.63:1359-1368

Dewick PM (2001) The shikimate pathway: aromatic amino acids and phenylpropanoids In Medicinal Natural Products: a Biosynthetic Approach, 2nd ed., pp. 137–186

Dixon R & Pasinetti G (2010) Flavonoids and isoflavonoids: from plant biology to agriculture and neuroscience. Plant Physiol 154, 453–457.

Takahashi A & Ohnishi T (2004) The significance of the study about the biological effects of solar ultraviolet radiation using the exposed facility on the international space station. Biol Sci Space 18, 255–260

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2025) PP 516-522

https://jam.utq.edu.iq/index.php/main

Kanoun K.)2011(. Contribution à l'étude phytochimique et Activiti antioxidant des Extraits de Myrtus communis L. (Rayhane) de la région de Tlemcen (Honaine). Mé Moire En Vue de obtention du Diplôme de Magister, Universite Aboubekr Belkaid Tlemcen. P118

Boukri, N.H. (2014). Contribution à l'étude phytochimique des éxtraits bruts des Épaices contenue dans le mélange Ras–el-hanout. Theme master Academique, Uni- Versité Kasdi Merbah Ouargla, p 99.