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Salvia aegyptiaca : A detailed Morphological and Phytochemical study

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ABSTRACT: Egyptian Sage is a woody much branched herb, forming small clusters. Flowers are borne in simple racemes, sometimes branched; verticillasters distant, 2-6-flowered. Bracts and bracteoles present. Flower-stalks are about 2 mm long elongating to about 3.5 mm in fruit. Sepal-cup ovate to tubular bell-shaped, about 5 mm in flower and about 7 mm in fruit, with a rather dense indumentum of stalkless oil globules, capitate glandular and eglandular hairs; upper lip of 3 closely connivent small about 0.3 mm teeth, clearly concave in fruit; lower lip with 2 tapering-subulate about 3 mm teeth, longer than upper lip. Flowers are violet-blue, pale lavender or white with purple or lilac markings on lip, about 6-8 mm long; upper lip straight or reflexed, much shorter than lower; tube somewhat annulate. Stems are leafy, erect-rising up, about 10-25 cm tall, above and below with short or long hairs. Leaves are ovate-oblong to linear-elliptic, about 1.2-2.5 x 0.4-1.0 cm, rounded toothed to sawtoothed, rugulose, on both surfaces with short eglandular hairs, usually indistinctly stalked with longer hairs on leaf-stalk. Nutlets are smooth, black, about 2 x 1 mm, scarcely trigonous, gelatinous on wetting. Egyptian Sage is found in Cape Verde Islands, Canary Islands, NW and N Africa, Sudan, Ethiopia, Arabian peninsula, Iran, Afghanistan, Pakistan, India. Flowering: March-May.
This plant is extensively exploited as a medicinal plant and locally called Tukh Malanga. It is used as antiseptic, carminative, digestive and analgesic. *Salvia aegyptiaca* has been studied due to its uses in folk medicine in the Old World to treat diarrhoea, gonorrhoea and haemorrhoids, plus it has been used as demulcent, antispasmodic, cicatrizant, antiseptic and stomachic.

Common name: Egyptian Sage
Hindi: Tukh malanga, Kohi Maur, Maur
Botanical name: *Salvia aegyptiaca* Family: Lamiaceae (Mint family)

CLASSIFICATION
Kingdom-Plantae
Phylum-Tracheophyta
Class-Magnoliopsida
Order-Lamiales
Family-Lamiaceae
Genus-*Salvia* L.
Species-*aegyptiaca*
Synonyms-*Pleudia aegyptiaca, Salvia arida, Thymus hirtus, Salvia pumila*

I. INTRODUCTION

This species is accepted, and its native range is Macaronesia to NW India.

Morphology

General Habit

Subshrub, much branched, 0.08–0.2(–0.4) m tall

Leaves

Leaves shortly petiolate or subsessile, narrowly elliptic, lanceolate or narrowly oblong, up to 20–55 × 3–8 mm, apex acute or narrowly obtuse, margin minutely crenate

Inflorescence

Cymes 1–3-flowered; bracteoles present

Calyx

Fruiting calyx 5–7 mm long; upper lip with incurved, less than 1 mm long lateral lobes and a minute mid lobe; lower lip with c. 3 mm long lanceolate slightly acuminate lobes[1]

Corolla

Corolla c. 6–7 mm long, pale lilac, lavender or white with marking of darker dots; upper lip almost straight, shorter than the lower lip

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Androecium

Filaments c. 2.5 mm long; lower theca fertile; connectives c. 2 mm long

Fruits

Nutlets 1.5–2 × 0.8–1.1 mm, black, producing mucilage when wet.

Distribution

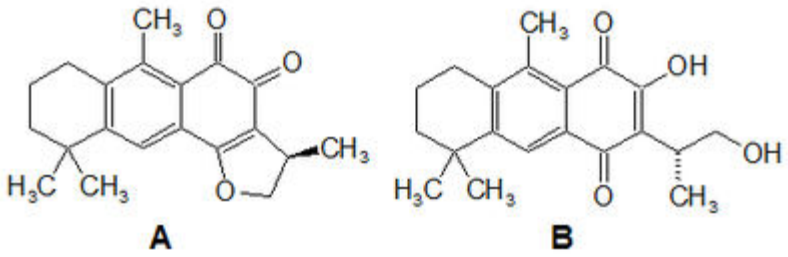
Cape Verde and the Canary Islands through North Africa, Eritrea, Arabia, Iran and Pakistan to western India.[2]

Ecology

Altitude c. 800 m.

Salvia aegyptiaca

6-Methylcryptoacetalide, **aegyptinones A** and **B**, 6-methyl-epicryptoacetalide and 6-methylcryptotanshinone have been isolated from this species.[3]



Aegyptinones

II. DISCUSSION

Salvia is a herbaceous perennial plant in Lamiaceae family but some varieties are cultivated as annual plant. To grow Salvia plant through seed consider the following points 1. Use a pot having 5-7 inch upper diameter and drainage holes. 2. Fill the pot with well drained soil. To sow seeds make a hole about 1/2 inch in soil, place seeds in it, cover with soil and apply water. 3. Maintain the moisture in soil by applying water if soil in pot (1-2 inch) feels dry to touch. 4. Keep the pot at a location receiving indirect bright light. Seeds will germinate within a 1-2 week. You can divide Salvia plants.[4] Simply by using cuttings 1. To propagate take healthy cutting of well mature stem to a length of 10-15 cm and remove any flowers leaves from it. 2. Then dip bottom of the cutting in rooting hormone, and Place the 3/4 portion cutting into a small container with well-draining soil and water the cuttings. 3. Rooting will start within 1-2 week. You prune these salvias back after flowering but not all the way. Take them back to at least where the first set of foliage starts on the flower stem â€“ this could be a pinch or you can take them down further if they need it.[5]

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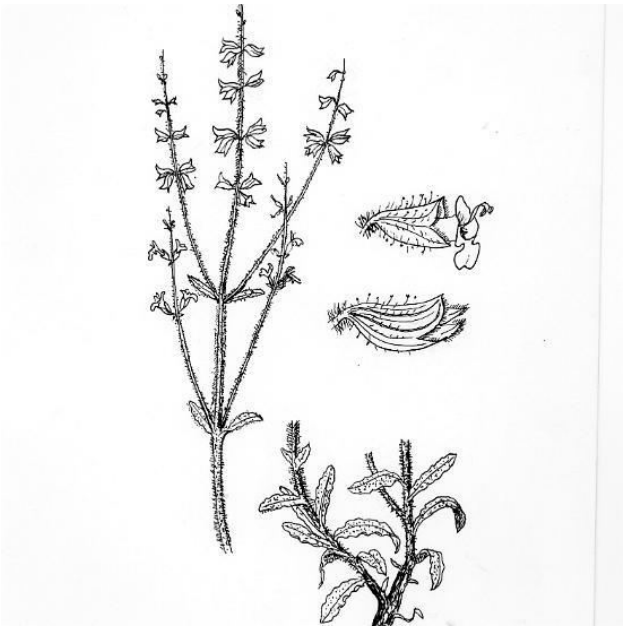
The main reasons of dying Salvia plant are as follows :

1. Due to over watering or less watering to plant.
2. Plant does not get proper sunlight.
3. Lack of nutrient.
4. Disease and pest infestation.[6]

Detailed Morphology

Suffruticose much branched herb, forming small tufts. Stems ± leafy, erect-ascending, c. 10-25 cm tall, above and below with short or long usually retrorse eglandular hairs, sometime with capitate glandular hairs on inflorescence axis. Leaves ovate-oblong to linear-elliptic, c. 12-25 x 4-10 (-14) mm, crenate to serrate, rugulose, on both surfaces with short eglandular hairs, sometimes with capitate glandular hairs, usually indistinctly (rarely clearly) petiolate with longer hairs on petiole. Inflorescence of simple racemes, sometimes branched; verticillasters distant, 2-6-flowered. Bracts and bracteoles present. Pedicels c. 2 mm long elongating to c. 3.5 mm in fruit, spreading-ascending. [7] Calyx ovate to tubular campanulate, c. 5 mm in flower and c. 7 mm in fruit, with a rather dense indumentum of sessile oil globules, capitate glandular and eglandular hairs; upper lip of 3 closely connivent small c. 0.3 mm teeth, clearly concave in fruit; lower lip with 2 acuminate-subulate c. 3 mm teeth, longer than upper lip. Corolla violet-blue, pale lavender or white with purple or lilac markings on lip, c. 6-8 mm long; upper lip straight or reflexed, much shorter than lower; tube somewhat annulate. Lower thecae fertile. Nutlets smooth, black, c. 2 x 1 mm, scarcely trigonous, mucilaginous on wetting.[8]



DIAGRAMMATIC REPRESENTATION OF *Salvia aegyptiaca*

Essential and Fixed Oil Chemical Profiles

The essential oil content in the flowers of *Salvia aegyptiaca* was analyzed by GC and GC-MS. Ten constituents, representing 98.7 % of the flowers essential oil were identified. The major component of *S. aegyptiaca* flowers essential oil was identified as octane (60.7%). The fixed oil content and fatty acid composition of the seeds were also analyzed in order to determine their potential for human or animal consumption. The oil content in these edible seeds was found to be 16.2 %. The oil was analyzed by GC and GC/MS and twenty six components identified which constituted 84.6 % of the oil. The main compounds of the seeds oil were characterized as n-dodecane (23.9%), tetradecane (15.6%) and n-decane (10.5%).[9]

The largest genus of the Lamiaceae family, the genus *Salvia* L. represents an enormous and cosmopolitan assemblage of nearly 1000 species displaying remarkable variation. It has undergone marked species radiations in three regions of the world: Central and South America (500 spp.), Central Asia/ Mediterranean (250 spp.) and Eastern Asia (90 spp.) [1]. Some species of the genus *Salvia* are used as flavorings, food condiments and perfume additives and cultivated for the aromatic characteristics [3]. *Salvia* species have been widely used in folk medicine as anticancer, antiviral,

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antimicrobial, antioxidant, anti-inflammatory and spasmolytic treatments and further have been used in relief of mental, nervous and gastrointestinal disorders [4].

Abietane, labdane, ictexane, neoclerodane and phenalenone types of diterpenoids [5,6], triterpenoids and sterols [7], phenolic acids, anthocyanins, flavonoids, coumarins and polysaccharides and their derivatives [4] were reported as major constituents of *Salvia* species. Most *Salvia* species are rich in essential oils, and various biologically active monoterpenoid/sesquiterpenoid have been reported in them possessing diverse biological activities such as antioxidant [8,9], anti-inflammatory [9,10], analgesic [11], anticonvulsant, anti-ulcerogenic, tranquillizing activities [12] and antibacterial activities [13]. Furthermore, the *Salvia* species, often pleasantly aromatic plants of potential economic interest, comprise the majority of the essential oil rich genera of the Lamiaceae, and particularly tend to accumulate monoterpenoid-rich essential oils.

Salvia aegyptiaca L. plant is extensively exploited as a medicinal plant. It is used as antiseptic, carminative, digestive and analgesic. Significant antibacterial, cytotoxic and antioxidant potential of *S. aegyptiaca* has also been identified [14]. Literature survey revealed several reports from the essential oil composition of *S. aegyptiaca* aerial parts [15-17] but there was no attempt to study the essential oil of *S. aegyptiaca* flower. Regarding it and the pleasant odor of the flowers, the present study was undertaken to investigate the volatile components of *S. aegyptiaca* flowers. Since there was no phytochemical investigation on the seeds oil, the chemical profile of *S. aegyptiaca* seeds oil was also studied.[18]

The hydrodistillation of *S. aegyptiaca* flowers gave pale yellow essential oil with pleasant odor and yields of 0.1% (v/w). Table 1 shows the list of compounds whose GC/MS concentration is not less than 0.1% of total peak concentration. Ten components were identified in the flowers essential oil which represented about 98.7% of the total composition. The major component of *S. aegyptiaca* flowers essential oil was identified as octane (60.7%). The studied essential oil comprised three hydrocarbon (69.9%), three monoterpenoids (6.3%) and four sesquiterpenoids (22.5%).[19]

The chemical profile of *S. aegyptiaca* seeds oil was also determined. The extracted oil was viscous and yellow in color. Seed oil consists mainly of hydrocarbons. *n*-Dodecane (23.9%), tetradecane (15.6%) and *n*-decane (10.5%) were found to be in maximum in *S. aegyptiaca* seeds oil, followed by hexadecane (6.6%) and palmitic acid (5.7%) while other components were in minor proportions.[20]

Identification of the compounds was made by comparing their mass spectra retention indices with those given in the literature. Five compounds were represented in the flowers essential oil at greater than 5% namely: octane (60.7%), caryophyllene oxide (8.4%), β-eudesmol (7.5%), decane (7.3%) and spathulenol (5.7%). Presence of high amounts of octane in the seeds essential oil was noticeable.

Lamiaceae family has been characterized by the occurrence of linoleic and linolenic acids in their seed oils and their importance as chemotaxonomic markers, for the cosmetic, nutritional and medicinal industries has also been demonstrated [21]. The oil from *S. aegyptiaca* seeds showed a low potential for use in food and medicine industries due to their fatty acids profile.

Due to the presence of octane as the main component of the flowers essential oil, future studies on the biological and pharmacological properties of the studied oil are suggested. The present study also revealed that *S. aegyptiaca* seeds oil could not be a new source of unsaturated fatty acid rich edible oil.

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Leaves and stem of *Salvia*

III. RESULTS AND CONCLUSION

Salvia aegyptiaca is a xerophytic perennial herb belongs to the Lamiaceae family commonly used for medicinal purposes. Laboratory experiments were carried out to assess the effects of temperature and salinity on seed germination and recovery responses after transferring to distilled water. Temperatures between 10 and 40 °C seem to be favourable for the germination of this species. Germination was inhibited by either an increase or decrease in temperature from the optimum (30 °C). The highest germination percentages were obtained at 0 mM NaCl; however, the increase of solution osmolalities progressively inhibited seed germination. The germination rate decreased with an increase in salinity for most of tested temperatures, but comparatively higher rates were obtained at 30 °C. Salt stress decreased both the percentage and the rate of germination. An interaction between salinity and temperature yielded no germination at 300 mM NaCl. By experimental transfer to distilled water, *S. aegyptiaca* seeds that were exposed to moderately saline conditions recovered and keep their ability to germinate mostly at low temperatures. At 300 mM NaCl, germination recovery decreased with increasing temperature and it was completely inhibited at 40 °C.[20]

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