Scientific Name: *Teucrium stocksianum Boiss* subsp. *stocksianum*

Local Name: Ja`adah

Arabic Name(s): Ja`adah, Togreyern, Mekhzani, Toum Alhayiah, Ja`aidah, Sa`atar Alhir, Gadha

Common Name: Mountain Germander

Family: Labiatae (Lamiaceae)

**Description:**
Dense, compact, aromatic perennial herb, hemispherical in outline up to 30 cm high and across, rootstock woody, stems erect very much branched and whitish in color. Leaves simple, opposite or in whorls, sometimes packed very densely on stems, 0.5-1.5cm long, sessile, oblong to linear, grey green; with hairs on both surfaces, margin crenate, distinct midribs, inside branches usually leafless. Flowers in terminal racemose inflorescences, small and white creamy to pinkish in color, with darker pink veins, upper lip 2-lobed, arching, with protruding stamens, larger lower lip 3-lobed. Fruit nut with 4 nutlets.

**Habitat & Distribution:**
North Africa, Iran, Pakistan, Arabia and Mediterranean zone. In UAE the plant is found in rocky habitats: wadis and hillsides and compact fine textured soils with stones and pebbles at all elevations.

**Part Used:**
Aerial parts and flowering heads

**Traditional & Medicinal Uses:**
In folk medicine the plant is astringent, expectorant, tonic, depurative, febrifuge, stimulant, vulnerary, appetizer, hypoglycemic, and infusion of aerial parts is used for stomachache and intestinal problems, feminine sterility, steam bath for colds and
fever, and for malaria. In UAE the plant is very well known and used for skin, stomach and kidney problems, renal colic, colds, fever and diabetes.

**Pharmacognosy and Phytochemistry**

Parts studied: Aerial parts (leaves, floral parts)

**Microscopical Description:**

**Leaf:** Transverse section of the leaf shows a two-wing-like structure with the two rounded margins as the edges of the wings slightly curving downwards towards the lower surface. The leaf is unilateral and the upper epidermis consists of small rectangular cells though they are markedly sinuous in surface view with thin cell walls. It is covered with a thick striated somewhat raised cuticle. The epidermal cells contain many angular and spherical amorphous masses and coloured materials. The diacytic stomata are oval to rounded in shape and are few in number. The upper epidermis bears numerous branched trichomes that have thick warty walls and also simple tapering conical trichomes. Relatively long glandular trichomes with two to four celled stalks and spherical heads with raised cuticles also exist. The palisade tissue consists of about two layers of oblong, loosely packed parenchyma cells. The spongy mesophyll consists of oblong to pear-shaped loosely held cells not constituting definite layers. Both palisade and spongy tissues contain coloured amorphous and crystalline masses. The lower epidermis consists of very small rectangular cells. From a surface view they have wavy, thin and somewhat beady cell walls. The lower epidermis has relatively more branched trichomes compared to the upper one but both have equally distributed glandular trichomes.

**Floral parts:** Microscopically, the floral parts show similar features as those of the leaf but the floral parts namely corolla, have extremely dense branched covering and glandular trichomes; the former are more warty. Epidermal cells are smaller and rectangular in shape and many are papillose. Cells contain more coloured substances and brownish pigments. Vessels are narrower, smaller in size and commonly annularly thickened (DPS ZCHRTM UnPub. Results)

(a). General TS of the leaf showing its typical structure, different zones, glandular and covering trichomes (less on the upper surface and dense on the lower one).
Surface view of the leaf upper epidermis showing the sinuous cell walls of the epidermal cells, bases of covering trichomes, coloured cellular contents and part of the underlying palisade layer. A portion of a floral part in surface view. (Magnifications: All x 400).

**Organoleptic characteristics:**

- **Appearance:** Solid powder
- **Colour:** Light brownish yellow
- **Odour:** Aromatic
- **Taste:** Very bitter

**Physicochemical constants:**

**Loss in weight on drying at 105°C (%):** 8.30

**Solubilities (%)**
- Alcohol solubility: 3.60
- Water solubility: 5.60
- 10% ethanolic extractive: 32.00 – 34.00

**Ash values (%)**
- Total ash: 11.40 - 12.40
- Water soluble ash: 2.00 - 2.20
- Acid-insoluble ash: 2.20 - 2.60

**Successive extractive (%)**
- Petroleum ether (60-80°C): 2.40 - 3.35
- Chloroform: 6.85 - 7.90
- Absolute alcohol: 6.80 - 8.90

**pH values**
- pH of 1% solution: 5.93
- pH of 10% solution: 5.32

The above results have appeared as publication (Kamil et al. 19999, DPS ZCHRTM Unpub. Results).

**Chemical constituents:**
Germacrene, sabinene, α-pinene, δ-cadinino, linalool, gurisol, methylated flavones, diterpenoids. (Kamil et.al 19999, DPS, ZCHRTM Unpub. Results, Rizk, 1986).

**Pharmacological and Toxicological studies:**

There are a number of species of the genus *Teucrium*. *T. polium* has been studied well scientifically. The boiled extract of the *T. polium* was found to inhibit the spontaneous contractile activity of rabbit ileal smooth muscle. *T. stocksianum* showed significant anti-gastric ulcer activity, cytoprotective activity, anti-inflammatory activity and caused progressive impairment of neuromuscular coordination in mice. *T. mascatense* has been reported to show homeostasis of glucose in normal and STZ diabetic rats.
*Teucrium polium* was studied on writhing test, a visceral pain model in mice. This study confirms the antivisceral pain properties of *T. polium* comparable to those of hyoscine and indomethacin and suggests a good place for it in antispasmodic therapies in human. (Abdollahi et. al., 2003). The study suggests that *T. capitatum* can induce acute hepatocellular necrosis, which could be clinically confused with acute viral hepatitis, and that some medicinal plants are not as safe as they are popularly known. (Dourakis, et. al., 21002).

Among the plants consumed was *Teucrium chamaedrys* (germander), which has been associated with several cases of hepatotoxicity (Perez, 2001). Significant hepatotoxicity has also been observed after the ingestion of tea or capsule of *Teucrium chamaedrys* (Larry et. al., 1999; Stickel, 2001). Treatment with the plant extract produced no statistically significant effect on the plasma biochemical variables that are considered indices of liver and kidney function. (Tanira, et. al 1997). *Teucrium buxifolium* species have displayed significant antiulcer and cytoprotective activity (Fernandez, et. al., 1997).

Hepatoprotective activity of an ethanolic extract of *Teucrium stocksianum* was investigated against paracetamol-induced hepatic damage in mice. *T. stocksianum* did not produce any lethality or adverse effects in the livers of treated mice. These results indicate that *T. stocksianum* ethanolic extract contains hepatoprotective constituents (Rasheed, et. al, 1995). The *Teucrium polium* boiled leaf extract produced an intestinal motility and blood pressuring in experimental animals (Suleiman et. al., 1988). An ethnobotanical survey showed that the plant is effective against cancer and prostate disorders (Ali-Shtayeh et. al., 2000).

The pharmacological and toxicological studies carried out in our laboratory and the results in brief, on *Teucrium stocksianum* (10% ethanolic extract) have been given below.

The results presented without references showed unpublished data (UPD, ZCHRTM, DBMS):
<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-inflammatory activity-Rat paw oedema</td>
<td>Extract showed significant anti-inflammatory activity (Islam et al., 1990a; Islam et al., 1990b).</td>
</tr>
<tr>
<td>Anti-inflammatory activity -Cotton pellet</td>
<td>Extract showed significant anti-inflammatory activity (Islam et al., 1990a; Islam et al., 1990b).</td>
</tr>
<tr>
<td>Anti-inflammatory activity-Rat paw oedema (Topical)</td>
<td>Extract showed significant anti-inflammatory activity (Islam et al., 1990a; Islam et al., 1990b).</td>
</tr>
<tr>
<td>Antinociceptive activity-Tail flick</td>
<td>Extract showed significant antinociceptive activity.</td>
</tr>
<tr>
<td>Antinociceptive activity-Hot plate method</td>
<td>Extract showed significant antinociceptive activity.</td>
</tr>
<tr>
<td>Antinociceptive activity-Writhing</td>
<td>Extract showed significant antinociceptive activity.</td>
</tr>
<tr>
<td>Studies on gastric ulcers-Indomethacin induced</td>
<td>Showed significant gastroprotective effect (Islam et al., 1999c).</td>
</tr>
<tr>
<td>Studies on gastric ulcers-Phenylbutazone induced</td>
<td>Showed less pronounced gastroprotective effect (Islam et al., 1999c).</td>
</tr>
<tr>
<td>Studies on gastric ulcers-NaOH induced</td>
<td>Showed very significant gastroprotective effect (Islam et al., 1999c).</td>
</tr>
<tr>
<td>Studies on gastric ulcers-Alcohol induced</td>
<td>Showed very significant gastroprotective effect (Islam et al., 1999c).</td>
</tr>
<tr>
<td>Studies on gastric ulcers-Cold stress induced</td>
<td>Produced less pronounced gastroprotective effect (Islam et al., 1999c).</td>
</tr>
<tr>
<td>Anti-secretary activity-Gastric acidity</td>
<td>Showed no anti-secretary effect (Islam et al., 1999c).</td>
</tr>
<tr>
<td>Anti-diabetic activity-STZ</td>
<td>Extract showed significant anti-diabetic activity (Islam et al., 1999d).</td>
</tr>
<tr>
<td>Gross behavioral studies-Tremor/Twitches</td>
<td>No toxic symptoms (Islam et al., 2000).</td>
</tr>
<tr>
<td>Gross behavioral studies-Writhing</td>
<td>No toxic symptoms were observed acute administration (Islam et al., 2000).</td>
</tr>
<tr>
<td>Gross behavioral studies- Diarrhea,</td>
<td>Mortality was recorded at higher doses on</td>
</tr>
</tbody>
</table>
Urination

sub acute and sub chronic administration (Islam et. al., 2000).

Mortality

No mortality was recorded (Islam et. al., 2000).

Acute toxicity studies-

Produced mild toxic signs appeared (Islam et. al., 2000).

LD$_{50}$ evaluation

>32 g/kg. (Islam et. al., 2000).

Hematological studies

Produced no significant change in hematological parameters (Islam et. al., 2000).

Biochemical studies

SGOT, SGPT increased; CPK reduced (Islam et. al., 2000).

Effect on body weight

No significant change (Islam et. al., 2000).

Effect on vital organ weight

Caused a slight increase in liver weight in treated animals (Islam et. al., 2000).

Teratogenicity

No teratogenic effect was observed.; No maternal toxicity observed; Mild foetotoxicity was seen (Islam et. al., 2000).

Mutagenicity

Extract did not show mutagenic effect (Clastogenic activity) in the model studied at the dose tested (Islam et. al., 2000).

Summary of the results:

*Teucrium stocksianum* showed significant antigastric ulcerhepatoprotective; antidiabetic activities; Teucrium significantly reduced blood pressure on i.p. administration in anesthetized rats. Teucrium has also been studied for its safety evaluation studies, including acute, sub-acute, sub-chronic toxicity studies and also including teratogenicity and mutagenecity evaluation.

Aqueous Extract:
<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>RESULTS</th>
</tr>
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<tbody>
<tr>
<td>Studies on gastric ulcers-NaOH induced</td>
<td>Produced gastroprotective effect.</td>
</tr>
<tr>
<td>Studies on gastric ulcers-Ethanol induced</td>
<td>Produced gastroprotective effect.</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
<td>Antisecretary activity</td>
<td>Produced antiseretary effect.</td>
</tr>
<tr>
<td>Studies on gastric ulcers-Aspirin induced</td>
<td>Produced gastroprotective effect.</td>
</tr>
<tr>
<td>Gross behavioral studies-Diarrhea, Urination</td>
<td>Mortality was recorded at higher doses on sub acute and sub chronic administration.</td>
</tr>
<tr>
<td>Mortality</td>
<td>Mortality was recorded.</td>
</tr>
<tr>
<td>Acute toxicity studies-</td>
<td>Produced toxic signs appeared.</td>
</tr>
<tr>
<td>LD$_{50}$ evaluation</td>
<td>$&gt;5$ g/kg.</td>
</tr>
</tbody>
</table>

**Summary of the results:**

*Teuckrium stocksianum* (aqueous extract) showed significant anti-gastric ulcer and anti-secretary activity at the dose tested. The extract was evaluated for its safety revealed that the aqueous extract showed over signs and symptoms at low doses administered orally and intraperitoneally to the experimental animals.

**Reference:**

- **Department of Biomedical Sciences,** Zyen Complex for Herbal Research and Traditional Medicine, Unpublished results.


