Scientific Name: *Alhagi graecorum* Boiss

Synonym: *Alhagi maurorum* medik

Local Name: Al-Agool, Shouk Aljemal, Shwaika

Arabic Name: Al-Agool, Shouk Aljemal, Hai, Agool, Shabram, Al lahhah, Shouk, Aljam.

Common Name: Camel thorn

Family: Fabaceae (Leguminosae)

Description:
A shrubby evergreen perennial herb, woody base, erect to ascending up to 60(-100) cm high, very much branched with rigid spiny twigs about 1 in. long. Leaves deciduous simple, small, present at base of each side twig, obovate to oblong, shortly petiolate, with rounded tip, up to 2 cm. Flowers solitary or in pairs in axils and along twigs, with deep red to purple papillionate petals. Fruit a cylindrical pod, 1-3 cm, fairly thick straight, dark brown with constrictions between seeds; seeds 3-8 kidney-shaped, smooth and brown.

Habitat & Distribution:
It is a plant of tropical and subtropical regions, found in Africa, Asia, US, Europe and Middle East. Common in disturbed Urban sites, abundant along riverbanks, canals, irrigation ditches and sometimes in cultivated field. Common along Arabian Gulf Coast; less frequent inland.

Part Used:
Aerial parts
Traditional and Medicinal Uses
The plant is well known in India, Iran and Arabia. In U.A.E the plant is used as a general tonic, anthelmintic and to treat constipation, jaundice, arthritis, roots are used as aphrodisiac and it is a good fodder for camels. In other countries the plant is known to be: diuretic, blood purifier, with antimicrobial activity, used for dysentery, upper respiratory system problems, wounds, hemorrhoids & uterus problems.

Pharmacognosy and Phytochemistry
Part studied: Leaves & branches

Microscopical Description:

Leaf: Both upper and lower epidermis are covered by thick cuticle. Epidermal cells of both surfaces are polygonal, periclinal of various sizes and shapes with straight to slightly wavy cell walls. Stomata in both surfaces are oval and of the anomocytic type. Upper epidermis is underlined by a single layer of hypodermis. The mesophyll is differentiated almost exclusively into elongated compact palisade parenchyma indicating the xeromorphic feature of the plant. The vessels of the embedded vascular tissues are annularly and spirally thickened.

Branches: Transverse section of a young branch is circular in outline and its epidermis is also covered by a thick cuticle. The epidermal parenchyma cells are comparatively larger than those of leaf and the scattered stomata are also larger. Cortex comprises few layers of parenchyma cells. Phloem consists of compact tissues of lignified sieve tubes with parenchyma and companion cells. Tissues are frequently tranversed by medullary rays. The xylem consists of a wide continuous ring of lignified tissues composed of vessels, tracheids, fibers, xylem parenchyma and medullary rays. Vessels are annularly and spirally thickened. Pith consists of oval and rounded thick-walled parenchyma cells (Kamil & et al.2001).

(a). Surface view of the upper epidermis showing its polygonal cells and underlying three large oblong hypodermal cells; oval stomata are also shown. (b). TS of leaf showing a layer of small rectangular upper epidermal cells underlain by large oblong cells of the hypodermis followed by relatively smaller palisade cells. (c). TS of a leaf petiole showing the heavily lignified vascular tissues. (Magnifications x 400, x 400 and x 100, respectively).
**Organoleptic characteristics:**
- **Appearance:** Powder
- **Colour:** Yellowish green
- **Odour:** Aromatic
- **Taste:** Acrid

**Physicochemical constants:**

**Loss in weight on drying at 105°C (%):** 9.2-9.5

**Solubilities (%)**
- Alcohol solubility (%): 14.00 – 15.00
- Water solubility (%): 23.00 – 24.00
- 10% ethanolic extractive (%): 34.00 – 35.50

**Ash values (%)**
- Total ash: 11.20 – 11.40
- Water soluble ash: 6.4 – 6.6
- Acid-insoluble ash: Nil

**Successive extractive (%)**
- Petroleum ether (60-80°): 4.6 – 6.8
- Chloroform: 1.00 – 1.10%
- Absolute alcohol: 8.1 – 8.2
- Distilled water: 26.8 – 27.00

**pH values**
- pH of 1% solution: 5.73
- pH of 10% solution: 5.42

**Chemical constituents:**
Alkaloids, flavonoids, glycosides, steroids, terpenoids, resins and tannins are found in different extracts. Quantitative analyses of important inorganic elements have been performed in ash. (Kamil, et.al 2000; 2001).

**Pharmacological and Toxicological studies:**
Both the ethanolic and chloroform extracts produced CNS stimulation in mice. Slight tremors, straub tail, rapid respiration, twitches, excitability and slight itching were recorded (Al-Yahya et. al., 1985a). The extract caused an increased force of contraction of isolated rabbit heart and slight fall in blood pressure of anaesthetized rabbit (Al-Yahaha et. al., 1985b). The flavonoid fraction of the plant is reported to possess anti-inflammatory activity. The extract showed no significant effect on the level of serum glucose, cholesterol and potassium in rats. However, chloroform extract caused a decrease in serum sodium content. The extracts showed antimicrobial activity and are not toxic to Brine shrimps (Al-Yahaya et. al., 1985 b).

The pharmacological and toxicological studies carried out in our laboratory and the results in brief, on *Alhahi maurorum* (10% ethanoile extract) have been given below. The results presented without references showed unpublished data (UPD, ZCHRTM, DBMS).
<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-inflammatory activity-Rat</td>
<td>Extract showed significant anti-inflammatory activity in acute (Zakaria et al., 1999).</td>
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<tr>
<td>paw oedema</td>
<td></td>
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<tr>
<td>Anti-inflammatory activity-Cotton pellet</td>
<td>Extract showed significant anti-inflammatory activity in sub-acute model (Zakaria et al., 1999).</td>
</tr>
<tr>
<td>Antinociceptive activity-Tail flick</td>
<td>Extract showed antinociceptive activity.</td>
</tr>
<tr>
<td>Antinociceptive activity-Writhing</td>
<td>Extract showed antinociceptive activity.</td>
</tr>
<tr>
<td>Gastric ulcer activity-Indomethacin.</td>
<td>Extract produced gastroprotective activity (Islam et. al., 200 a; Islam et. al., 200 b).</td>
</tr>
<tr>
<td>Gastric ulcer activity-Phenylbutazone</td>
<td>Extract produced gastroprotective activity (Islam et. al., 200 a; (Islam et. al., 200 b).</td>
</tr>
<tr>
<td>Gastric ulcer activity-NaOH</td>
<td>Extract produced cytoprotective activity (Islam et. al., 200 a; Islam et. al., 200 b).</td>
</tr>
<tr>
<td>Gastric ulcer activity-Ethanol</td>
<td>Extract did not show cytoprotective activity (Islam et. al., 200 a; Islam et. al., 200 b).</td>
</tr>
<tr>
<td>Sexual studies-Copulatory activity</td>
<td>Extract showed significant sexual stimulant activity.</td>
</tr>
<tr>
<td>Sexual studies-ICP</td>
<td>Extract increased intracavernous pressure.</td>
</tr>
<tr>
<td>Testosterone quantification</td>
<td>Increased testosterone level in treated animals.</td>
</tr>
<tr>
<td>Anti-hypertension activity-Anesthetic rats</td>
<td>Extract produced a transient increase in diastolic blood pressure, normalized after 30 min. Increased heart rate.</td>
</tr>
<tr>
<td>Locomotor activity</td>
<td>Significant increase in locomotor activity was observed (Islam et al., 2000c).</td>
</tr>
<tr>
<td>Gross behavioral studies-Tremor/Twitches</td>
<td>No toxic effect observed (Islam et al., 2000c).</td>
</tr>
<tr>
<td>Gross behavioral studies-Writhing</td>
<td>No toxic effect observed (Islam et al., 2000c).</td>
</tr>
<tr>
<td>Gross behavioral studies-Diarrhea, Urination</td>
<td>Produced no diarrhea and urination (Islam et al., 2000c).</td>
</tr>
</tbody>
</table>
### Mortality
No mortality recorded (Islam et al., 2000).

### Motor co-ordination (String and Platform test)
Motor coordination not affected (Islam et al., 2000c).

### Acute toxicity studies
No toxic symptoms observed at the dose tested (Islam et al., 2000c).

### LD$_{50}$ evaluation
$> 10$ g/kg (Islam et al., 2000c).

### Sub-acute toxicity studies
No significant symptomatic changes were observed (Islam et al., 2000c).

### Sub-chronic toxicity studies
Extract did not show any significant changes in body weight, vital organs studied (Islam et al., 2000c).

### Hematological studies
No changes in hematological parameters (Islam et al., 2000c).

### Biochemical studies
No changes in biochemical parameters except slight increase in plasma calcium and phosphorus (Islam et al., 2000c).

### Effect on body weight
No changes observed (Islam et al., 2000c).

### Effect on vital organ weight
No changes observed (Islam et al., 2000c).

### Teratogenicity
Extract did not show teratogenic effect; No foetotoxicity and maternal toxicity observed (Islam et al., 2000c).

### Mutagenicity
Extract did not show mutagenic (Clastogenic) activity as evidenced by micronuclei test (Islam et al., 2000c).

### Summary of the results:
*Alhagi maurorum* (10% ethanolic extract) showed significant antiinflammatory, analgesic, gastroprotective and sexual activity. The 10% ethanolic extract did not show serious toxic changes at the dose tested. No teratogenic and mutagenic effects were observed.

#### 2-Aqueous Extract:

<table>
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<td>Sexual studies-Copulatory activity</td>
<td>Extract showed sexual stimulant activity.</td>
</tr>
</tbody>
</table>
Vasorelaxant activity-Isolated aortic strip
Extract produced relaxation in the contracted aortic strip.

Cardiotoxic activity & HR-Isolated rat atria
Did not show any significant change.

Effect on GIT smooth Muscle-Isolated guinea pig ileum
Did not show any significant change in isolated Guinea pig ileum.

Effect on GIT smooth Muscle-Isolated rat fundus
Produced contraction.

Gross behavioral studies-Tremor/Twitches
No toxic symptoms observed.

Gross behavioral studies-Writhing
No toxic symptoms observed.

Gross behavioral studies-Diarrhea, Urination
No diarrhea and urination observed.

Mortality
No death recorded.

Summary of the results:
*Alhagi maurorum* (Aqueous ethanolic extract) showed significant sexual stimulant activity and showed no overt toxic signs and symptoms at the dose tested.

Reference:

- **Andrews, F.W.** The Flowering Plants of Anglo-Egyptian Sudan; (1950&1952) vol 1+II; Arbroath, Scotland.
- **Department of Biomedical Sciences**, Zyed Complex for Herbal Research and Traditional Medicine, Unpublished results.


• محمد العواد، جورج لحام النباتات الطبية واستعمالاتها(1988) الجزء الأول الطبعة الثانية.الأهالي، سوريا.