Scientific Name: *Ruta chaleepensis* L.

Synonym(s): R. bracteosa (DC), R. angustifolia (Pers), R. chalepensis var. bracteosa (DC) Bioss., R. graveolens (L) var. angustifolia Hook. f.

Local Name(s): Seithab, Faijin

Arabic Name(s): Sadab, Seidhab, Shadhab, Shathab, Alkhatf, Fidjel, Rusta Bou ghans.

Common Name(s): Herb of Grace

Family: Rutaceae
Description:
A evergreen perennial herb, somewhat woody below, strongly aromatic, erect to ascending, up to 50-80(100) cm high. Leaves silvery blue-green, alternate, oblong, pinnately divided into lanceolate lobes, with dentate margin. Small yellow flowers, c. 12mm across, in terminal corymbs; petals with fringed margins. Fruit subglobose capsule, 7-8mm, divided about half-way to base into 4-5 acute lobes. Seeds reniform, transversely wrinkled, tuberculate.

Habitat & Distribution:
This ancient medicinal plant found in tropical & sub tropical regions of the world, commonly grown in Africa, Western Asia, Mediterranean Europe. In UAE it is found in Northern Emirates during rainy seasons.

Part Used:
Aerial parts

Traditional & Medicinal Uses:
The plant is bitter, acrid, abortifacient, anthelmintic, emmenagogue and ophthalmic; antipyretic, analgesic, anti-inflammatory, antiseptic, irritant, expectorant, carminative, antispasmodic, stimulant. Infusion of plant is useful in infantile convulsions, bronchitis, jaundice, toothache, earache, stomachache, typhoid, rheumatic fever, intestinal problems, colds, earache and as gargle. A decoction of the plant has been used in the treatment of paralysis, coughs, stomachaches and as ophthalmic and vulnerary.

Leaves and seeds boiled with oil and used topically for rheumatism, sprains, blood circulation and swellings. Fumigation by leaves for catarrh and cough in children. The leaves have been heated then placed inside the ear to treat earache. An essential oil obtained from the leaves is used in perfumery, food flavoring, for epilepsy and against scorpion and snake bites. The leaves are used as a condiment, added in very small amounts only, to salads and sandwiches. Flowering branches used as vulnerary, emmenagogue and as anti-spasmodic. Dried leaves are often used in wreaths and other decorations.

Pregnant woman should not eat rue. Handling the plant, especially when in bloom, can cause skin irritation.

Pharmacognosy and Phytochemistry

Parts studied: Leaves & Stem

Microscopical Description:

Leaf: A transverse section of the leaf shows that it is unilateral. The upper epidermis consists of papillose cells covered by a slightly striated thick cuticle. The palisade tissue is composed of two layers of compactly packed longitudinal cells with straight thick cell walls and they contain some coloured particles. The spongy mesophyll cells are oblong and some of these cells contain single cluster crystals of calcium oxalate.
The spongy tissues also embed large glands and they are also traversed by angular vascular tissues that contain spirally and reticulately thickened vessels. The lower epidermis consists of small oval or rounded cells covered with raised thick cuticle but the cells are not papillose. The lower epidermis bears almost round anomocytic stomata that are fairly distributed.

**Stem:** the powder shows long compactly packed lignified fibres with thick walls and large lumens. It also shows large groups of compactly packed vascular tissues with their vessels reticulately and spirally thickened. (DPS ZCHRTM Unpub.Results).

(a). A fragment of the leaf showing the papillose cells of the upper epidermis. (b). TS of a portion of a leaf showing the papillose upper epidermis, the two layers of the palisade tissues, the spongy mesophyll cells (some containing calcium oxalate cluster crystals), embedded vascular tissues, and rounded or oval lower epidermal cells. (c). A fragment of the stem showing long compactly packed fibres with thick cell walls and large lumens surrounding a group of vascular tissues with their vessels reticulately and spirally thickened. (Magnifications: All x 250).

**Organoleptic characteristics:**

<table>
<thead>
<tr>
<th>Appearance:</th>
<th>Powder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour:</td>
<td>Light gray</td>
</tr>
<tr>
<td>Odour:</td>
<td>Aromatic</td>
</tr>
<tr>
<td>Taste:</td>
<td>Tasteless</td>
</tr>
</tbody>
</table>

**Physicochemical constants:**

**Loss in weight on drying at 105°C (%)**: 9.20-9.60

**Solubilities (%)**

<table>
<thead>
<tr>
<th>Solubility</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol solubility</td>
<td>6.40</td>
</tr>
<tr>
<td>Water solubility</td>
<td>27.20</td>
</tr>
<tr>
<td>10% ethanolic extractive</td>
<td>40.10</td>
</tr>
</tbody>
</table>

**Ash values (%)**

<table>
<thead>
<tr>
<th>Ash values</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total ash</td>
<td>13.20-14.00</td>
</tr>
</tbody>
</table>
Water soluble ash: 2.40-2.60
Acid-insoluble ash: 0.20-0.40

**Successive extractive (%)**
- Petroleum ether (60-80°C): 3.00
- Chloroform: 2.6
- Absolute alcohol: 10.80
- Distilled water: 18.50

**pH values**
- pH of 1% solution: 5.92
- pH of 10% solution: 5.25

The above results are under process of publication (DPS ZCHRTM Unpub. Results).

**Chemical constituents:**
Alkaloids and coumarins, flavonoids and ligneus. (Ghazanfar 1994DPS, ZCHRTM Unpub. results).

**Pharmacological and Toxicological studies:**

*Ruta chelpensis* showed antispasmodic effect and stimulates nervous system. The oil is used as anti helminthic, antispasmodic and anti-epileptic, emmenogogue, antiinflammatory and antibacterial activity Al-Okbi et al., 2002; Alzoreky and Nakahara, 2003.

The leaves yielded two furanocoumarins, one quinoline alkaloid, and four quinolone alkaloids, showed anti-fungal activity. The anti-mycotic activity was observed in vitro experiment on the strains of Candida albicans isolated from clinical samples obtained in the course of acute vaginitis (Oliva et al., 2003). *Ruta graveolens* also showed anti-mycotic activity (Trovato et al., 2000).

Dried leaf infusions of *Ruta chalepensis* were found to cause perinatal changes in mice, at daily doses of 0.16, 0.80 and 1.60 g/kg, administered p.o. from 1 to 14 days post coitum, showing embryotoxic effects (Zeichen et al., 2000).

Acute (24-h) and chronic (90-day) oral toxicity studies on the ethanolic extracts of *Foeniculum vulgare* fruits and *Ruta chalepensis* aerial parts, carried out in mice, revealed a significant fall in RBC level in treated animals (Shah et al., 1990).

A commercial tincture prepared from *Ruta* exhibited a moderate photo-mutagenicity in an arginine-requiring mutant strain of Chlamydomonas reinhardtii (Schimmer and Kuhne, 1990). Mutagenicity testing of a commercial extract from Rutae herba revealed a strong effect in Salmonella typhimurium strain TA98 without S9 mix. The extract studied contains different mutagenic activities and these are only partially due to the furoquinolines present in the extract (Paulini et al., 1987).

The pharmacological and toxicological studies carried out in ZCHRTM laboratory and the results in brief, on *Ruta chelpensis* (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>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-hypertension activity-Anesthetic rats</td>
<td>Extract did not affect systolic pressure. Diastolic pressure was reduced transiently immediately after administration of the extract at both doses tested (Radha et al., 2000; Zakaria et. al., 2000a; Zakaria et. Al., 2000c).</td>
</tr>
<tr>
<td>Anti-hypertension activity-DOCA-hypertensive rats</td>
<td>In DOCA-salt hypertensive rats, the extract reduced the MBP, but reduction was not significant tested (Radha et al., 2000; Zakaria et. al., 2000a; Zakaria et. Al., 2000c)</td>
</tr>
<tr>
<td>Vasorelaxant activity -Isolated aortic strip</td>
<td>Produced dose dependent relaxation of aortic strip pre-contracted with NA and 5-HT.</td>
</tr>
<tr>
<td>Vasorelaxant activity -Isolated rat mesenteric bed</td>
<td>The extract produced dose dependently reduced the mesenteric arterial resistance.</td>
</tr>
<tr>
<td>Locomotor activity</td>
<td>In the rats the extract did not affect the locomotor activity.</td>
</tr>
<tr>
<td>Effect on Prothrombin time</td>
<td>The extract at both doses did not change the prothrombin time.</td>
</tr>
<tr>
<td>Effect on GIT smooth Muscle-Isoleted rabbit jejunum</td>
<td>The extract dose dependently inhibited the amplitude of contraction and resting tension of rabbit jejunum.</td>
</tr>
<tr>
<td>Antidiabetic activity, STZ, GTT</td>
<td>Produced mild antidiabetic activity using two antidiabetic animal models (Zakaria et al., 2000b; Chan and Al—Attas, 2000).</td>
</tr>
<tr>
<td>Gross behavioral studies-Tremor/Twitches</td>
<td>No tremors were observed</td>
</tr>
<tr>
<td>Gross behavioral studies-Writhing</td>
<td>No writhings were observed</td>
</tr>
<tr>
<td>Gross behavioral studies-Diarrhea, Urination</td>
<td>No diarrhea and urination was noticed</td>
</tr>
<tr>
<td>Gross behavioral studies-locomotor activity</td>
<td>Treatment caused weakness and reduced locomotors activity</td>
</tr>
<tr>
<td>Mortality, i.p.</td>
<td>Death was recorded (varying %) in all groups except at the dose 400-mg/kg</td>
</tr>
<tr>
<td>Mortality, p.o.</td>
<td>Oral administration did not cause any death</td>
</tr>
</tbody>
</table>
and produced any signs of

**Anti-asthmatic activity-Bronchial smooth muscle**
Produced about 100% relaxation of tracheal chain in pre-contracted with histamine and ACh at the concentration of 1.0 mg/ml.

**Anti-asthmatic studies**
The extract showed no significant effect on the onset time of cough.

**LD<sub>50</sub> evaluation, p.o.**
6400 mg/kg

**LD<sub>50</sub> evaluation, i.p.**
563 mg/kg

**Summary of the results:**
The plant showed anti-inflammatory activity, analgesic activity and an increased GIT motility and anti-diarrheal activity; showed mild reduction in blood pressure in DOCA-salt hypertensive animals.

**Microbiological studies:**
The methanol extracts extract of the plant inhibited the growth of B. cereus and fungus Rhizoctonia solani, Fusarium culorum, Heterobasidium annosum. Whilst, the ethyl acetate extract yielded two furanocoumarins, one quinoline alkaloid, and four quinolone alkaloids with highly active against fungus Botrytis cinerea, Phomopsis species and Phomopsis viticola. (Alzoreky et al., 2003; Ojala et al., 2000; Oliva et al., 2003).

**Reference:**
- Bolous, L(1983), Medicinal Plants of North Africa
- **Department of Biomedical Sciences**, Zyed Complex for Herbal Research and Traditional Medicine, Unpublished results.
- **Department of Pharmacognostic Sciences**, Zyed Complex for Herbal Research and Traditional Medicine (ZCHRTM), unpublished results.