Scientific Name: *Rhazya stricta* Decne.

Local Name: Harmal

Arabic Name: Harmal, Adfir

Common Name(s): Senhwar, Sahaer, Dogbane

Family: Apocyaceae
Description:
Glabrousshrub, often woody-based, 30-80 cm tall, the dense semi-erect branches to 1m, glabrous. Leaves alternate, very variable, sub succulent, elliptic to narrowly ovate, 5-10 cm long x 1-2 cm across, tip acute, margin entire, base unequally attenuate, sub sessile, yellowish green when dry, glabrous. Flowers arranged in shortly pedunculate axillary terminal corymbs, pedicels 2-3 mm. Calyx with 5 narrowly triangular lobes, 2 mm long. Corolla tube, greenish yellow, 8-14 mm long; lobes 5, outside bluish green, inside white, more or less round, acuminate, 3-6 mm across. Fruits paired follicles, erect, parallel, semi cylindrical, 5-8 cm long x 0.5 cm across, tip attenuate, smooth, terete, yellowish green. Seeds compressed, 6-8 mm long, narrowly winged, brown. Leaves and long thin pods turn brown and brittle.

Habitat & Distribution:
Throughout tropical regions all over the world. In UAE in alluvial plains, sandy areas and wadis, and dominant in heavily grazed areas because it is not palatable to livestock, sometimes forming pure stands.

Part(s) used: Leaves, flowers, seeds

Traditional & Medicinal Uses:
Chief medicinal plant of the most desert areas in Arabian Peninsula. Dry plant more effective than fresh one, leaves bitter. The plant is a general tonic, digestive, anti-inflammatory and anti-microbial, stimulant, anticancer, and pain killer.
In UAE the plant known to be purgative, anthelmintic, it is used much to treat: fever, allergy, diabetic, dysentery, stomach problems; and inhaled to treat headache and asthma. In other countries used to treat rheumatism, skin problems, where leaf infusion used for pharyngitis, syphilis and body weakness. The plant considered as a good renitent to make cheese.

Pharmacognosy and Phytochemistry

Parts Studied: Leaves

Microscopical Description:
Leaf: A transverse section of the leaf shows its unilateral characteristic. The epidermal cells are ovoid to rounded with thin cell walls and they are covered with a very thick cuticle having faint striations and it is somewhat raised forming small curves. The palisade tissues consist of one layer of rectangular and slightly broad loosely packed cells with thin wavy cell walls. The spongy tissues consist of rounded to oblong loosely packed cells that contain many small whitish prisms or light green rounded particles. They also embed vascular tissues that include spirally thickened vessels. The lower epidermis consists of oblong to rounded cells that have covering trichomes with thick warty cell walls found mainly near to the margins. They also bear glandular trichomes with large spherical heads and thick curved stalks. Stomata are oval in shape and anomocytic and they are abundant on both epidermises. 9 DPS ZCHRTM Unpub. Results).
(a). TS of the leaf showing a papillose epidermis covered with a thick raised cuticle forming small curves. The underlying palisade layer consists of rectangular slightly broad cells underlain by spongy tissues. (b). A surface view of the leaf upper epidermis showing polygonal cells with oval anomocytic stomata. (c). A surface view of the leaf lower epidermis showing polygonal cells with warty cell walls; stomata are oval, anomocytic and abundant. (Magnifications: All x 400).

**Organoleptic characteristics:**

- **Appearance:** Powder
- **Colour:** Greenish yellow
- **Odour:** Odourless
- **Taste:** Bitter

**Physicochemical constants:**

**Loss in weight on drying at 105°C (%)**: 7.40

**Solubilities (%)**
- Alcohol solubility: 20.00
- Water solubility: 37.60
- 10% Ethanolic extractive: 47.00

**Ash values (%)**
- Total ash: 7.80
- Water soluble ash: 4.20
- Acid-insoluble ash: 0.30

**Successive extractive (%)**
- Petroleum ether (60-80°C): 8.00-8.80
- Chloroform: 12.11-13.30
- Absolute alcohol: 19.80-20.20
- Distilled water: 18.60-19.30

**pH values**
- pH of 1% solution: 5.13
- pH of 10% solution: 4.86

The above results are under process of publication (DPS ZCHRTM unpub. Results).
Chemical constituents:

Many indole alkaloids have been reported of which vallesiachotamine, sewarine and tetrahydro secamine, show cytotoxic activities. (Kamil et.al 2000; DPS,ZCHRTM Unpub. results; Shahina 1994).

Pharmacological and Toxicological studies:

The alkaloid fraction of the *Rhazya stricta* used to assess the microsomal activity of cytochrome P 450. These results suggest that Rhazya has the potential to interact with other drugs that are biotransformed by cytochrome P450, when given concomitantly with it. (El-Kadi et. al., 2003).

The toxic effects of oral administration of 0.25 g/kg *Rhazya stricta* leaves on Najdi sheep were investigated for 42 days was not fatal to sheep while single oral doses of either *N. oleander* leaves or the mixture with *R. stricta* leaves proved fatal to animals within 24 hours with toxic symptoms (Adam, 2002).

*Rhazya stricta* has been shown to have an antioxidant action in rats. The study suggested that the water extract may contain compounds that could potentially ameliorate gentamycin nephrotoxicity in rats (Ali, 2002).

The effect of *Rhazya stricta* leaves and *Nigella sativa* seeds observed are found to be associated with macrocytic hypochronic anaemia and alterations in serum aspartate transaminase (AST) and alanine transaminase (ALT) activities and concentrations of total protein, albumin, globulin, cholesterol, calcium and other serum constituents (Al-Homidan et. al., 2002). The leaf showed antioxidant actions in the rat (Ali et. al., 2000). The plant has been reported to have low toxicity (Ali et. al., 2000).

The plant extract has been reported to be associated with increases in serum AST and (LDH), in elevated bilirubin and urea concentrations, and decreased total protein, albumin and calcium concentrations, and leucopenia and anemia (Adam et. al., 1998). The plant extract or component(s) might possess an antidepressant-like effect (Ali et. al., 1998). It is reported that the simultaneous treatment of normal and diabetic rats with the plant extract (0.5, 2.0 and 5.0 g /kg) and glybenclamide (5.0 mg/ kg) significantly exacerbated the effects on glucose, insulin and glucagon induced by the extract or by glybenclamide when given separately showing the possibility of adverse effect (Ali et. al., 1997).

It showed as a source of antispasmodic agent (Tanira et. al., 1996). Lyophilised extract and a daily administration of *R. stricta* to rats for 5 days failed to produce any signs of organ damage (Wasifi et. al., 1994).
The pharmacological and toxicological studies carried out in ZCHRTM laboratory and the results in brief, on Rhazaya stricta (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-inflammatory activity-Rat paw oedema</td>
<td>Showed a significant anti-inflammatory activity.</td>
</tr>
<tr>
<td>Anti-inflammatory activity-Cotton pellet</td>
<td>Showed a significant anti-inflammatory activity.</td>
</tr>
<tr>
<td>Anti-inflammatory activity-Topical</td>
<td>Showed a significant anti-inflammatory activity.</td>
</tr>
<tr>
<td>Antinociceptive activity-Hot plate method</td>
<td>Showed a significant antinociceptive activity.</td>
</tr>
<tr>
<td>Antinociceptive activity-Tail flick</td>
<td>No significant effects recorded using tail flick method.</td>
</tr>
<tr>
<td>Antinociceptive activity-Writhing</td>
<td>Significant antinociceptive activity using writhing method.</td>
</tr>
<tr>
<td>Studies on gastric ulcers-Indomethacin induced</td>
<td>Produced gastroprotective effect (Islam et. al., 1999).</td>
</tr>
<tr>
<td>Studies on gastric ulcers-Phenylbutazone induced</td>
<td>Produced gastroprotective effect (Islam et. al., 1999).</td>
</tr>
<tr>
<td>Studies on gastric ulcers-NaOH induced</td>
<td>Produced gastroprotective effect (Islam et. al., 1999).</td>
</tr>
<tr>
<td>Studies on gastric ulcers-Ethanol induced</td>
<td>Produced gastroprotective effect (Islam et. al., 1999).</td>
</tr>
<tr>
<td>Studies on gastric ulcers-Cold stress</td>
<td>Produced gastroprotective effect (Islam et. al., 1999).</td>
</tr>
<tr>
<td>Anti-diabetic activity-GTT</td>
<td>Showed mild antidiabetic activity (Radha et al., 2000).</td>
</tr>
<tr>
<td>Anti-diabetic-STZ</td>
<td>Showed lowering effect (Radha et al., 2000).</td>
</tr>
</tbody>
</table>
Anti-hypertension activity-Anesthetic rats
Mild reduction of BP & HR observed.

Locomotor activity
Six weeks treatment did not change the locomotor activity.

Gross behavioral studies-Tremor/Twitches
Administered orally, produced no toxic effect; Overt signs and symptoms recorded on i.p administration, mortality recorded (Islam et al., 2000).

Gross behavioral studies Writhing (Oral)
No overt signs and symptoms (Islam et al., 2000).

Gross behavioral studies - Diarrhea, Urination (Oral)
No overt signs and symptoms (Islam et al., 2000).

Mortality
Administered orally produced no mortality (Islam et al., 2000).

Motor co-ordination (String & Platform test)
Motor co-ordination not affected (Islam et al., 2000).

Acute toxicity studies-
Administered orally produced no toxicity at the dose tested (Islam et al., 2000).

LD$_{50}$ evaluation
>6.4 g/kg. (Islam et al., 2000).

Sub-chronic toxicity studies.
Vital organ study showed that ovary weight was increased (Islam et al., 2000).

Haematological studies.
No significant alteration noticed (Islam et al., 2000).

Biochemical studies.
Significant changes in some parameters including CPK, GT and Mg decreased and Ca increased (Islam et al., 2000).

Teratogenicity
Not teratogenic effect; No Foetotoxicity & no maternal toxicity observed (Islam et al., 2000).

Mutagenicity
Not mutagenicity (Clastogenic activity) reported (Islam et al., 2000).

Summary of the results:
The plant showed significant anti-inflammatory, analgesic activity, antigastric ulcer activity. It also showed mild anti-hypertension activity. The plant also showed a mild antidiabetic activity. The safety evaluation studies showed that acute administration of the extract did not show any overt signs and symptoms. However, chronic
administration of the extract altered some biochemical and haematological parameters. No mutagenic activity was recorded as confirmed with the micronuclei test. The extract produced no teratogenic effects administered orally.

Reference:

- **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.


Riad Alami & AS’Ad Macksad, Medicinal Plants of Kuwait ( without date).
