

SCELETIUM TORTUOSUM HERBA

Definition

Sceletium Tortuosum Herba consists of the fermented and dried overground parts of *Sceletium tortuosum* (L.) N.E. Brown (Aizoaceae)

Synonyms

S. tortuosum (L.) N.E. Brown = *S. compactum* L. Bolus, *S. framesii* L. Bolus, *S. joubertii* L. Bolus^{GR3}

Vernacular names

Channa, kanna (San), kougoed (A)

Description

Macroscopical^{GR3}



Figure 1: Live plant

Prostrate to scrambling perennial succulent herb; **leaves** imbricate, flat triangular in sectional view, with tips incurved, 30-40 × 10-15mm, with large bladder cells giving foliage a glistening surface, dying back after flowering to leave skeletal remains; **flowers** (Jul-Sept.) white, pale yellow, pale pink or salmon, ± 20-30mm in diameter; fruits 4-5 locular, with valve wings.



Figure 2: line drawing

Microscopical

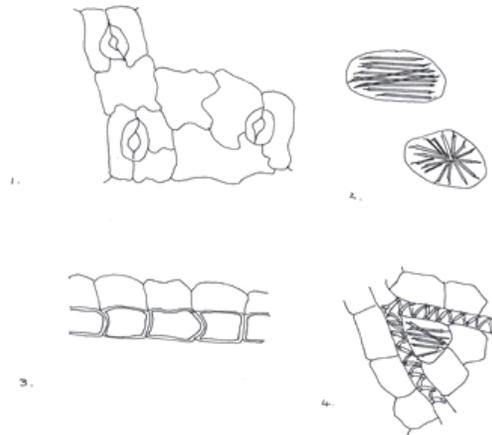


Figure 3: microscopical features

Characteristic features are: the bladder cells of the leaf epidermis, thin-walled, balloon-like in sectional view (3); the polygonal cells of the leaf epidermis with paracytic stomata (1); the numerous calcium oxalate crystals, of two forms: stellate crystals and raphides (2), the latter occur in large bundles in cells of the leaf mesophyll, associated with the veins (4); the absence of tannin, suberised tissue and mucilage.

Crude drug

When fresh the foliage is bright green and succulent; traditional preparation¹ methods involve crushing the whole plant including roots and placing the material in a sealed skin, plastic or canvas bag in the sun for a week with occasional mixing, to ferment. The fermented material is then dried in the sun, giving a stringy light brown product resembling chewing tobacco.

An alternative and more rapid method of preparation involves baking the fresh material in hot sand over a firebed for one hour.

Geographical distribution

Western and Eastern Cape Provinces from Namaqualand to Montagu, often on quartzite outcrops.

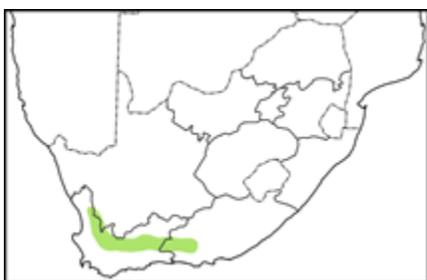


Figure 4: distribution map

Quality standards

Identity tests

Thin layer chromatography on silica gel using as solvent a mixture of toluene:diethyl ether:1.75M acetic acid (1:1:1). Reference compound cineole (0,1% in chloroform). Method according to Appendix 2a.

R_f values of major compounds: 0, 51 (purple); 0,57 (purple); 0.66 (purple); 0.80 (light green); 0.87 (light green); cineole: 0.89 (blue-purple)

¹ Smith, M.T., Crouch, N.R., Gericke, N. and Hirst, M. (1996). Psychoactive constituents of the genus *Scelletium* N.E. Brown and other Mesembryanthemaceae: a review. *Journal of Ethnopharmacology* **50**: 119-130.

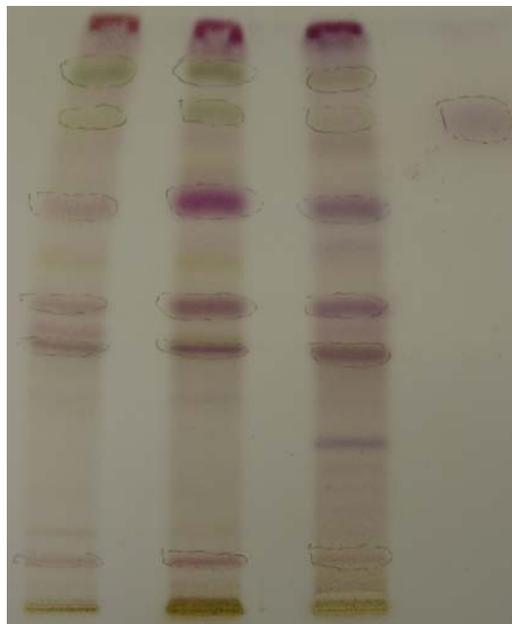


Figure 5: TLC plate

HPLC on C₁₈ column, method according to Appendix 2b.

Major compounds:

Methanol extract: Retention times (mins): 2.38; 3.15; 4.89; 7.84

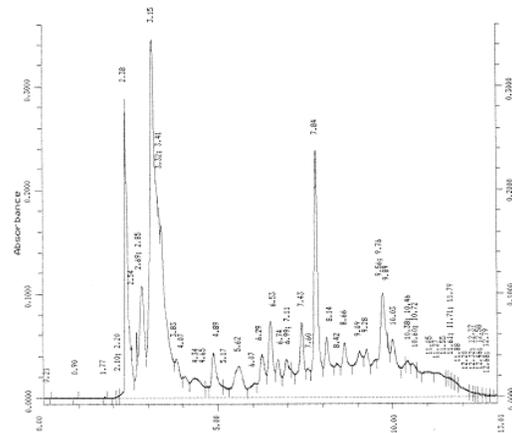


Figure 6: HPLC spectrum

Total ash: 16.27% (determined according to the BHP 1996 using 1.0g dried ground material; a bright peacock blue residue remains after ignition in muffle furnace)

Purity tests

Assay

Not yet available

Major chemical constituents²

Scelletium species have been shown to contain at least 9 indole alkaloids, belonging to one of three structural types. In *S. tortuosum* (1-1.5% alkaloids) mesembrine appears to be most abundant (0.3% and 0.86% have been reported, respectively, in leaf and stem). Mesembrenone and 4'-O-demethylmesembrenol are also present. Tortuosamine, also isolated from *S. tortuosum*, represents a second structural type in which the pyrrole ring is opened. Alkaloid levels appear to fluctuate seasonally and may be highest in late spring/early summer; this is the time when plants are traditionally gathered and prepared for use.

Investigation of alkaloid ratios and total alkaloid content demonstrated that both are substantially altered by traditional processing methods. Mesembrine and 4'-O-demethylmesembrenol levels were lower in fermented than in unfermented material, while mesembrenone content had doubled during fermentation/drying. Material crushed and dried at 80°C immediately after collection had similar alkaloid patterns to fermented material.

In order to investigate the role of enzyme action in determining alkaloid patterns, samples were treated with liquid nitrogen to stop enzyme activity, followed by either drying at 80°C, fermentation/drying at 80°C, or immediate extraction with boiling ethanol. Material that had been extracted with boiling ethanol immediately after collection resembled unfermented material in alkaloid ratios, while samples dried before extraction had similar alkaloid ratios to fermented material.

Chemical analysis of unfermented material has demonstrated high levels of oxalates (3.6-5.1%). This finding is reflected in the ash value and the presence of calcium

² Smith, M.T., Field, C.R., Crouch, N.R. and Hirst, M. (1998). The distribution of mesembrine alkaloids in selected taxa of the Mesembryanthemaceae and their modification in the *Scelletium* derived "kougoed". *Pharmaceutical Biology* **36**(3): 173-179 and refs. therein.

oxalate is visually apparent on microscopic examination. It is thought that the traditional methods of preparation (fermentation or direct heat) may facilitate microbial degradation or sublimation of oxalates, rendering the product more palatable.

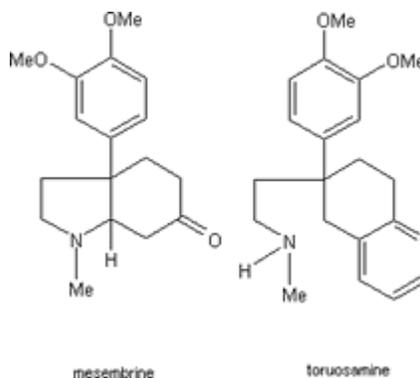


Figure 7: chemical constituents

Dosage forms

A "plug" of dried fermented drug is chewed; a decoction or infusion may also be prepared. Fresh leaf may be applied directly to a painful tooth or a drop of fresh leaf juice placed on the tongue ^{GR20}.

Medicinal uses¹

The use of "kougoed" by the Khoi-khoi and San peoples as a mood enhancer, sedative, analgesic for toothache and stomach pains, and appetite/thirst suppressant was noted and recorded by early settlers at the Cape, who adopted its use for similar purposes ^{GR11}. This has continued to the present day ^{GR20}.

A preparation of *Scelletium tortuosum* has recently become available in tablet form as a complementary medicine for the treatment of depression. Claims have been made for its efficacy as an anxiolytic and that serotonin-uptake inhibitory activity had been demonstrated for the preparation. No published literature could be found to support these claims. Some anecdotal evidence is however reported ¹. A patent/patents have been taken out on a number of *Scelletium* species, presumably on the basis of some modification to the traditional knowledge/usage.

Pharmacology/bioactivity

See medicinal uses.

Contraindications

No information is available

Adverse reactions

Users report no side effects

Precautions

No special precautions; caution should be exercised by those using other medication, in view of possible drug interactions.

Dosage

To be determined.

