Profile Monograph: *Sceletium tortuosum*

Sceletium herb

A General aspects

1. General description

Botanical name:

Sceletium tortuosum (L.) N.E. Br.

Main synonyms:

S. boreale L. Bol., *S. compactum* L. Bol., *S. concavum* (Haw.) Schwantes, *S. framesii* L. Bol., *S. gracile* L. Bol., *S. joubertii* L. Bol., *S. namaquense* L. Bol. (both varieties), *S. ovatum* L. Bol., *S. tugwelliae* L. Bol.

Family: Mesembryanthemaceae

Vernacular names:

sceletium (English); *kanna* (Khoi); *kougoed* (Afrikaans); *sceletium* (French); *Sceletium* (German); *sceletium* (Italian)

2. Geographical distrubution:

Western and Northern Cape Provinces of South Africa (western parts, from the Little Karoo northwards to Namaqualand) (Gerbaulet 1996).

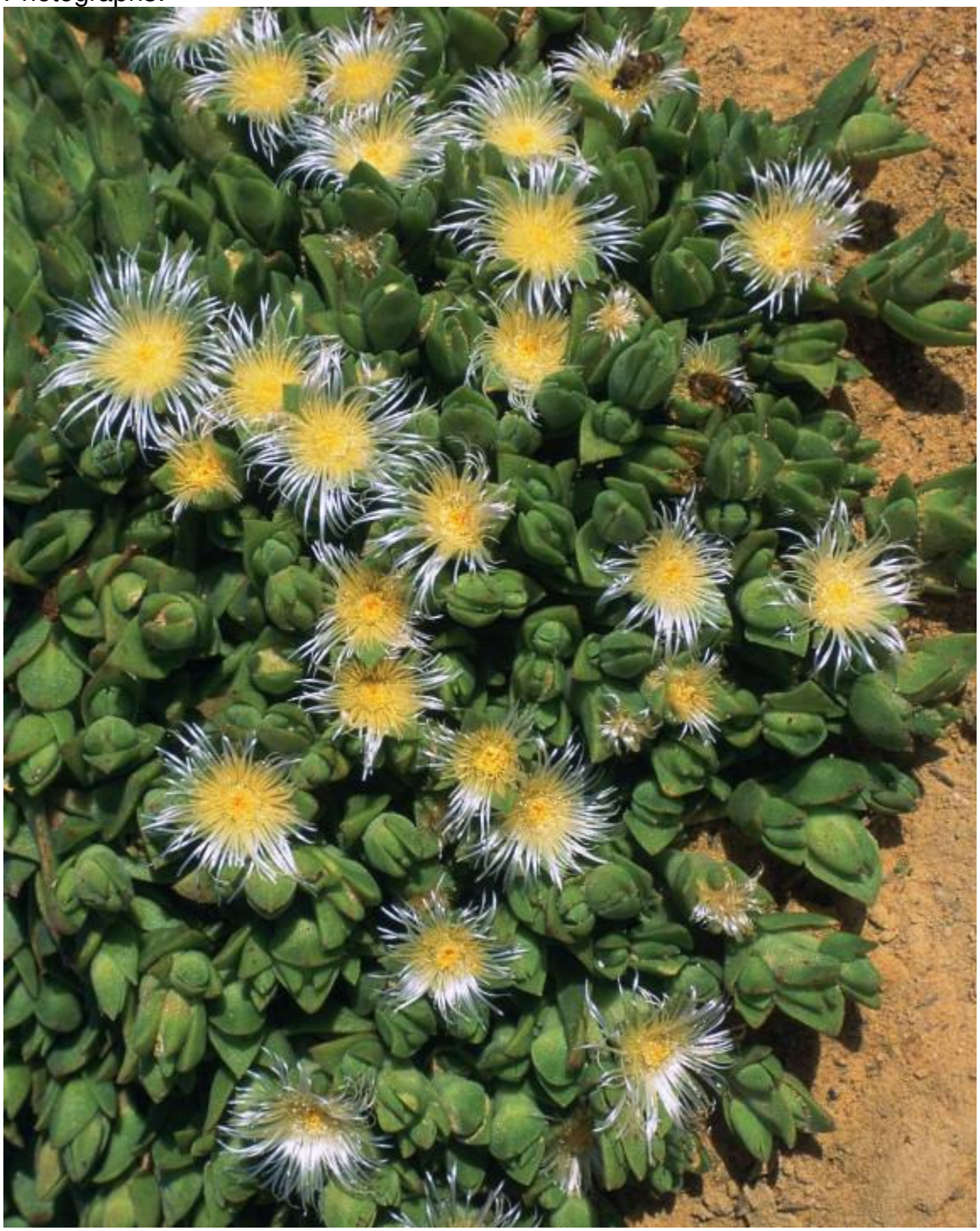
3. Conservation status:

not listed (rare in nature)

4. Description

Sceletium tortuosum is a short-lived, perennial, succulent plant with creeping stems and overlapping pairs of leaves that have glistening water cells (bladder cell idioblasts) on their surfaces. The leaves become “skeletonised” when they dry out – the persistent leaf veins remain on the plant – hence the generic name *Sceletium*. Pale to bright yellow or orange-yellow flowers are borne along the branch tips, followed by pale brown, papery capsules containing numerous small, reddish brown, kidney-shaped seeds (Van Wyk & Gericke 2000, Van Wyk & Wink 292). There are eight species of *Sceletium*, but only *S. tortuosum* is well known and used in commercial products. It differs from other species in having straight secondary veins, prominent idioblasts, incurved leaf tips and imbricate leaves (Gerbaulet 1996).

Photographs:



(a) Flowering plant of *Sceletium tortuosum*

(b) Scel*e*tium plant showing sceletonised leaves


(c) Traditional product (“kougoed”)

5. Origin and preparation of plant material

Origin: South Africa

Plant parts used: dried whole plant

6. Cultivated/wildcrafted:

Substantial quantities of raw material from cultivated sources are available. Wildcrafting is totally unacceptable.

Preparation/processing: The whole plants are simply dried. A traditional method is used to prepare the plant (Smith *et al.* 1996) but this is not considered necessary for commercial purposes.

7. Flowering/harvesting time:

The whole plants are harvested at the end of the flowering period (spring or summer, depending on the region of cultivation (winter or summer rainfall regions).

B Identification and Quality Control

See introduction for methods used.

8. Plant material investigated:
dried and powdered leaves

9. Extractability of dried material
[water, ethanol and acetone concentration in mg/ml from 1 g of plant material]

extractant	water	ethanol	acetone
mg/g	110	32	78
% extracted	11	3.2	7.8

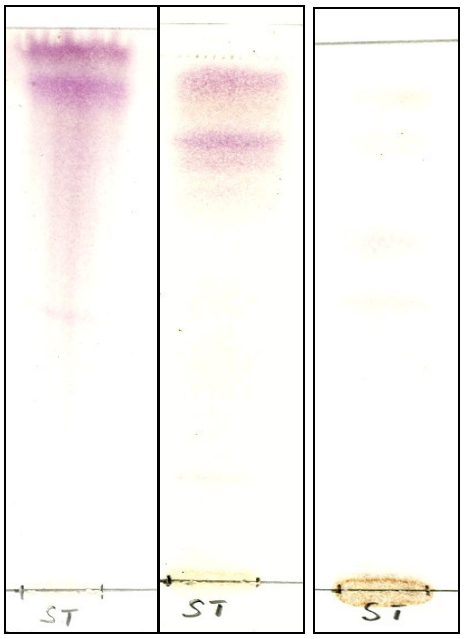
10. Physical characteristics

Whole dried plant fibrous with small greenish-brown leaves (no smell).

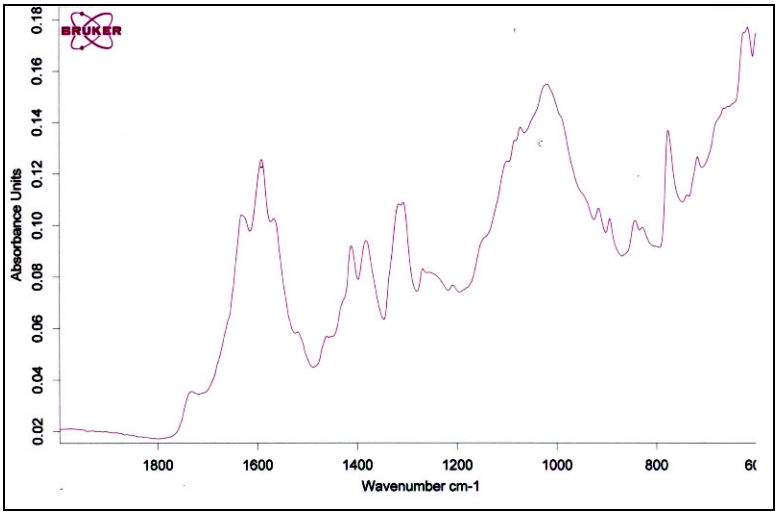
11. Identification by standardized TLC system.

Solvent systems from left to right EMW, CEF, BEA. This separates polar compounds, intermediate polarity compounds and non-polar compounds

Detection reagent vanillin-sulphuric acid.



12. Infra red scan of powder.



13. Specialized TLC or HPLC if available.

The alkaloids are easily studied on TLC using published methods. They are also easily studied by GC (using standard methods for alkaloids) and HPLC.

14. Concentration of active principle if known.

The main active compound is mesembrine, which is present in very variable yields of 0-2.4% of dry weight, depending on the source of plant material.

With high-yielding clones, the mesembrine content should be at least 0.5-1% dry weight (Gericke & Van Wyk 1997).

15. Possible adulteration and mistaken identity.

Sceletium may be adulterated with *Aptenia* species or with low-yielding material from unknown provenance.

16. Standard specifications applied to most herbal medicines e.g. pesticide content, microbial load, ash and heavy metal content.

See general guidelines recommended by the WHO (1998).

Microbiology:

Salmonella spp. – negative

Escherichia coli – negative

Aerobic bacteria – not more than 10^5/g or ml

Fungi – not more than 10^4/g or ml

Enterobacteria and Gram-negative bacteria – not more than 10^3/g or ml

Total ash:

Not more than 5%

Acid-insolubale ash:

Not more than 1%

Water-soluable extractive:

Not less than 15%

Foreign matter:

Not more than 1%

Pesticide residues:

In accordance with national requirements.

Aldrin and dieldrin – not more than 0.05 mg/kg.

Heavy metals:

Lead in final dosage form – not more than 10 mg/kg

Cadmium in final dosage form – not more than 0.3 mg/kg.

Adulteration:

Possible adulteration with *Aptenia* species or with low-yielding material of unknown provenance is possible. TLC and GC identification and quantification is essential.

17. Stability of product

Limited data and experience. The alkaloids are fairly stable in the dry product but unstable in solution.

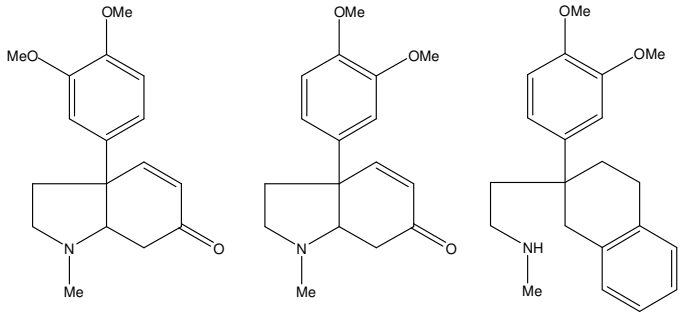
C Use and Efficacy

18. Formulation and dosage

In tablet form: A dose of 50-200 mg of the dried, powdered herb is included in tablets and capsules (about 1-4 mg of alkaloid) and taken two or three times a day. Traditionally, the dried product is regularly chewed throughout the day (the frequency is controlled by the slight hypnotic effect, similar to the practise of smoking tobacco). Teas, decoctions and tinctures are also reported to be used, but details about dosage levels are unknown and/or unpublished.

19. Chemical constituents according to literature

Sceletium tortuosum contains mesembrine as major alkaloid, together with mesembrenone, mesembrenol and tortuosamine (Smith *et al.* 1996, Gericke & Van Wyk 1997).



Mesembrine Mesembrenone Tortuosamine

20. Medicinal uses [traditional uses and uses described in pharmacopoeias]

Sceletium elevates mood and decreases anxiety, stress and tension. The traditionally prepared dried plant material is chewed, or smoked, or powdered and inhaled as a snuff (Watt & Breyer-Brandwijk 1962, Watt 1967, Rood 1994, Forbes 1986, Smith *et al*. 1996, Van Wyk & Gericke 2000, Van Wyk & Wink 2004)

21. Known biological activities [bioassays and pharmacological information]

Mesembrine is a potent serotonin-uptake inhibitor (a novel mechanism of action for this known molecule) that suggests therapeutic applications for anxiety and depression, and other serious mental health conditions (Gericke & Van Wyk 1997).

22. Clinical evidence for efficacy

None.

D Safety

23. Toxicity].

Literature

The plant is not hallucinogenic, and no adverse effects have been documented. It is remarkable that there appears to be no physical or psychological dependency, even after many years of habitual use (Van Wyk & Gericke 2000).

Brine shrimp toxicity assay

LD_{50} = 447 µg/ml.

Vero cell line

LD_{50} = 395 µg/ml

24. Warnings, contraindications and side effects and interactions with other drugs if known

None known.

E Evaluation of probable safety

25. List species and evaluate probable safety according to the following criteria based on Goldberg et al. Botanical Safety Handbook:

***Sceletium tortuosum* – probable safety - 1**

- 1 Can be safely consumed when used appropriately.
- 2a For external use only.
- 2b Not to be used during pregnancy.
- 2c Not to be used while nursing.
- 2d Specific use restrictions.
- 3 To be used only under the supervision of an expert qualified in the appropriate use of this substance.
- 4 Insufficient data for classification.

F Evaluation of probable efficacy

26. List species, use and evaluate probable efficacy for each use and safety on following scale

Sedative (anxiety, stress) **+**

- ++ efficacy clinically proven
- ++! efficacy clinically proven, plant material with toxic potential
- + efficacy pharmacologically proven
- +! efficacy pharmacologically proven, plant material with toxic potential
- +/- efficacy traditionally proven
- +/-! efficacy traditionally proven, plant material with toxic potential
- - usage cannot be recommended because of risks related
- ? insufficient information for classification

G References

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