TULBAGHIA RHIZOMA

Definition

Tulbaghia Rhizoma consists of the fresh or dried subterranean organs of *Tulbaghia alliacea* L.f. or *T. capensis* L. (Alliaceae).

Synonyms

Vernacular names
Wild garlic; wilde knoffel, knoflook (A); moelela, sefothafotha (S); ivimba-'mpunzi (Xh); sikwa (Z)

Description

Macroscopical [1], [GR3]

T. alliacea: geophyte with rhizome up to 10cm long; **leaves** 15-25cm × 0.3-0.5cm, strap shaped, smelling of onion when bruised; **flowers** (Mar-May) borne in an umbellate cluster of 6-10 individuals on a scape 15-30cm long; perianth tube and segments green; corona orange-brown; corona lobes fused into a 3-6 crenate fleshy collar, 4-8mm long, on which the upper anthers are inserted.
T. capensis: geophyte with fleshy rhizomatous rootstock, strong smelling; **leaves** linear, 10-45cm × 0.4-1.2cm, spreading; **flowers** (Apr-Oct) on pedicels up to 2cm long, 6-10 in umbellate inflorescence on a scape 15-30cm long, opening in succession; perianth segments purple brown to olive green, corona trifid fleshy, each lobe deeply bifid, to 5mm long, orange.

Figure 1b. Whole plant: T. capensis

[1] Burbidge, R. B. (1978). A revision of the genus *Tulbaghia*. *Notes from the Royal Botanic Garden (Edinburgh)* **36**: 77-103.

Figure 1a. Inflorescence: T. alliacea

Figure 2: line drawing

Microscopical

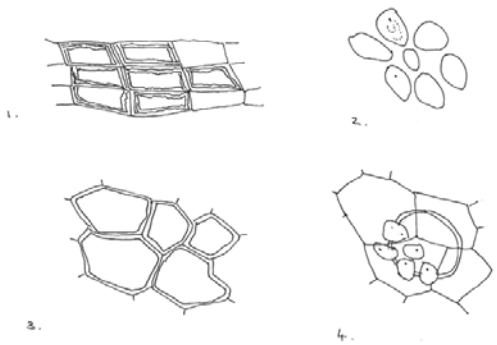


Figure 3: microscopical features

Characteristic features are: the thin walled parenchyma containing numerous ovoid to round starch grains (2); individual grains up

to 14µ in diameter; the oil ducts, scattered throughout the matrix of parenchyma but particularly abundant in the central stele, bright yellow in fresh rhizomes, darker yellow-brown in dried material, up to 240µ in diameter (4); the thin layer of pale brown cork tissue (1); the collenchyma of the cortex (3) the absence of calcium oxalate crystals and tannins.

Crude drug

Cream-coloured globose to elongated rhizomes, up to 50mm in diameter, often with attached fleshy roots. Odour very strong sulphurous, texture crisp fleshy.

Geographical distribution

T. alliacea: Western and Eastern Cape Provinces, from Clanwilliam to the Cape Peninsula, eastwards to Port Elizabeth and north into KwaZulu-Natal, Mpumalanga and Gauteng (also Lesotho, Swaziland, Botswana and Zimbabwe), in clay or loam, in a variety of habitats.
***T. capensis*:** Western Cape Province, on rocky slopes and rock crevices from 0-1000m; Cape Peninsula to Knysna.

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, 12 (blue); 0, 61 (light blue); 0, 72 (dark blue); 0, 8 (blue grey); 0, 80 cineole (blue grey).

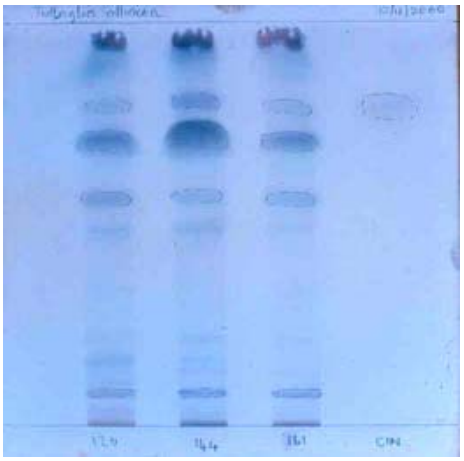


Figure 5: TLC plate

HPLC on C_{18} column, method according to Appendix 2b.

Major compounds:
Methanol extract:
Retention times (mins): 11,38; 19,70; 24,21; 28,29.

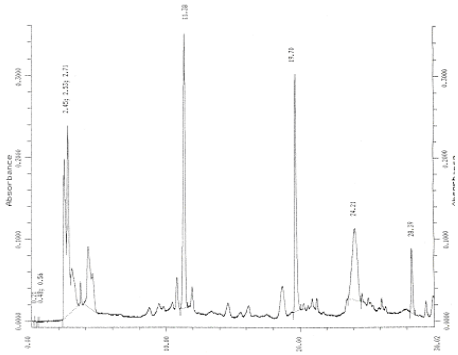


Figure 6: HPLC spectrum

Ethanol (70%) soluble extractive value: not less than 13.15% determined using dried material (range: 13.15-23.82%)

Purity tests

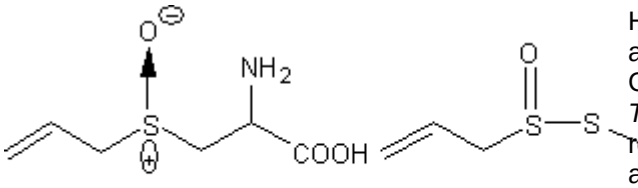
Assay

Not yet available

Major chemical constituents

The secondary chemistry of *Tulbaghia* species is not well known. The related genus *Allium* is characterised by the presence, in most plant organs, of allyl sulphides e.g. the amino acid (+)-S-allyl-L-cysteine sulphoxide (alliin) and its by-product of enzymatic action, allicin. These

and related compounds account for the pungency of garlic, chives, onions and leeks (all *Allium* species). Similar compounds are probably present in *Tulbaghia* species.



Alliin Allicin

Figure 7: chemical constituents

Dosage forms

Wild garlic is most commonly prepared as an infusion in water or milk, taken orally; less often used as an enema. In the Eastern Cape the bruised bulb is used to prepare a medicated bath.

Medicinal uses [GR1, 19 - 24]

In the Western Cape, bulb preparations are taken orally to treat fever, as a remedy for tuberculosis and influenza, as an antihypertensive or to expel intestinal worms. As a medicated bath, wild garlic is used for the treatment of paralysis, rheumatism and to reduce the temperature in a feverish patient. A highly regarded medicinal herb, wild garlic is also taken in the Western Cape as a prophylactic against winter infections. The related *T. violacea* is often substituted in areas where *T. alliacea* and *T. capensis* are not available.

Pharmacology/bioactivity

There is little in the published literature concerning the bioactivity of *T. alliacea* or *T. capensis*. Reports of the inhibitory activity of hot water extracts of *T. violacea* against *Mycobacterium tuberculosus and Escherichia coli,* but not *Staphylococcus aureus,* have been noted [GR1]. The results of disc assays in our laboratories indicated *in vitro* antimicrobial activity against *Mycobacterium smegmatis* and *Candida albicans* but not against *Pseudomonas aeruginosa* or *Staphylococcus aureus.*

The results of an investigation of cytotoxicity and antiviral activity of 16 South African plant species[2] showed that aqueous extracts of *Tulbaghia alliacea* were not markedly cytotoxic, at any concentration used, to HeLa or Vero cells, but exhibited cytotoxicity at all dilutions used to Jurkat E6.1, AA-2 and CEM-SS cells. Possible toxicity to cattle of *Tulbaghia alliacea* extracts has been reported [GR1]. In a direct *in vitro* cell culture antiviral assay, aqueous extracts were not found to inhibit replication of either Coxsackie B2 virus or HSV-1.

Contraindications

None known.

Adverse reactions

Individuals with known allergy to onions, garlic and other members of Alliaceae should use preparations of this herb with caution.

Precautions

No special precautions

Dosage

If fresh material is used, one large bulb is sliced and infused with 1 litre of boiling water in a closed vessel. When cool, the infusion is strained and kept in the refrigerator/cool place. If dried material is used, two level teaspoonfuls (± 7g) may be infused with 1 litre of boiling water.
Adults: one teacupful (180ml) twice daily
Children: half a teacupful (90ml) twice daily

[2] Treurnicht, F. T. (1997). An evaluation of the toxic and potential antiviral effects of some plants used by South Africans for medicinal purposes. MSc thesis, University of Stellenbosch.