

## CARPOBROTUS EDULIS FOLIA

### Definition

Carpobrotus Edulis Folia consists of the fresh or dried leaves of *Carpobrotus edulis* (L.) L. Bol. (Aizoaceae)

### Synonyms

### Vernacular names

Suurvy (A), sour fig, t'kôbô-vy, gaukum, gouna

### Description

#### Macroscopical<sup>GR3</sup>

Robust, mat-forming perennial with trailing stems to 2m in length, rooting at the nodes; **leaves** 40-80mm long, dull green, succulent, opposite, the leaf pairs united at the base, glabrous, straight to slightly curved, up to 10mm in diameter, with margin serrated along the keel and apex sharply pointed; **flowers** (Aug-Oct) up to 50mm in diameter, with numerous pale yellow petals, turning pinkish as the flowers age; **fruits** fleshy, edible.



Figure1: Live plant



Figure 2: line drawing

### Microscopical

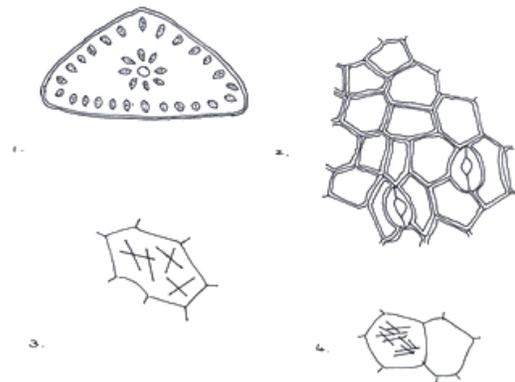


Figure 3: microscopical features

Characteristic features are: the leaf, triangular in T/S (1) showing an outer layer of thick walled, cuticularised epidermal cells with numerous paracytic stomata (2); beneath the epidermis is a ring of idioblasts containing red-brown tannin masses; these stain dark blue-black with  $\text{FeCl}_3$  solution; tannin idioblasts are also present in a ring round the central vascular strand; calcium oxalate raphides are common and may be up to  $120\mu$  long, occurring singly or in bundles in the thin walled cells of the leaf mesophyll (3+4).

## Crude drug

Succulent dull green when fresh, drying to brittle pale green; taste sour and astringent.

## Geographical distribution

Widespread in the Western and Eastern Cape Provinces on sandy flats and slopes, mostly inland; naturalised in many countries as a dune or sand stabiliser.

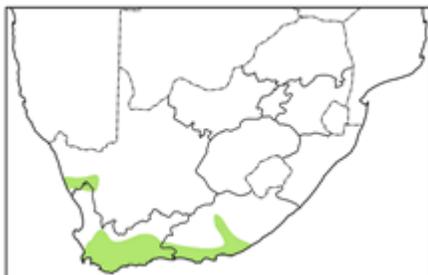


Figure 4: distribution map

## 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: 0,54 (purple); 0,66 (purple); cineole: 0,81 (blue-purple)

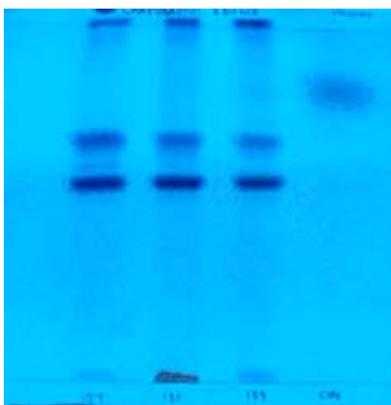


Figure 5: TLC plate

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

### Major compounds:

Methanol extract:

Retention times (mins): 11.46; 14.03; 14.87; 17.53; 18.03

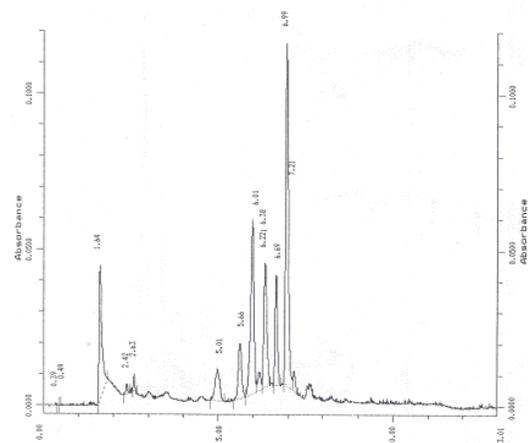


Figure 6: HPLC spectrum

Total ash: 14.77%

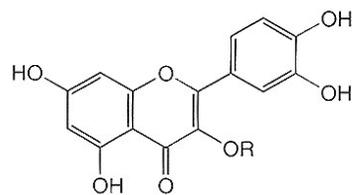
## Purity tests

## Assay

Not yet available

## Major chemical constituents

The leaves contain flavonoids<sup>1</sup> (rutin, neohesperidin, hyperoside), catechin, ferulic acid and catechol tannins<sup>GR1</sup> (19.4 and 14.16%) respectively in dried leaf and stem. Citric and malic acid are present.



Hyperoside; R = galactosyl

Rutin; R = rhamno-glucosyl

Figure 7: chemical constituents

<sup>1</sup> Van der Watt, E. and Pretorius, J.C. (2000). Purification and identification of active antibacterial components in *Carpobrotus edulis* (L.) L. Bol. *Journal of Ethnopharmacology* **76**: 87-91.

## Dosage forms

Fresh juice obtained from pounded leaf may be applied directly to the affected part or, combined with ingredients such as honey, vinegar, lemon juice and olive oil, taken orally or used as a gargle or mouthwash. An ointment is prepared from the leaf juice mixed with castor oil or lard.

## Medicinal uses

A valued Khoi-Khoi and San remedy adopted by most other ethnic groups in South Africa, preparations of the leaf juice are taken by mouth to check diarrhoea and to treat tuberculosis and applied externally to burn wounds, sores or to the oral mucosa to treat thrush and ulcers. A gargle/mouthwash is used for sore throat or gum infections.

## Pharmacology/bioactivity

Fresh leaf juice (freeze dried and reconstituted) and aqueous extracts of dried leaf showed *in vitro* antimicrobial activity against *Staphylococcus aureus* and *Pseudomonas aeruginosa*, in the concentrations used for disc assays in our laboratories. No activity was noted against *Candida albicans* and *Mycobacterium smegmatis*.

A crude methanolic, detanninised extract of the plant showed antimicrobial activity against *Moraxella catarrhalis*<sup>1</sup>. Fractionation of the crude extract (tannins not removed) showed that activity resided in acetone and ethyl acetate fractions. The former, containing tannins, was not tested further but the ethyl acetate fraction (detanninised) yielded six compounds all of which inhibited the growth of *Moraxella catarrhalis*, *Staphylococcus aureus* and *Staphylococcus epidermidis*. Five of the six compounds were identified by thin layer chromatography as rutin, neohesperidin, hyperoside, catechin and ferulic acid. Some of these showed weak activity against other human pathogens.

*In vitro* assays of 2 other South African *Carpobrotus* species<sup>2</sup> showed that aqueous and ethyl acetate fractions obtained from both *C. muirii* and *C. quadrifidus* inhibited the growth of *Staphylococcus aureus* and *Mycobacterium smegmatis*, but had no effect on that of *Candida albicans* or *Pseudomonas aeruginosa*. Detanninised ethyl acetate fractions were further examined by bioautography and several zones of inhibition identified on TLC plates overlaid with agar inoculated with *Staphylococcus aureus* or *Mycobacterium smegmatis*.

## Contraindications

None known.

## Adverse reactions

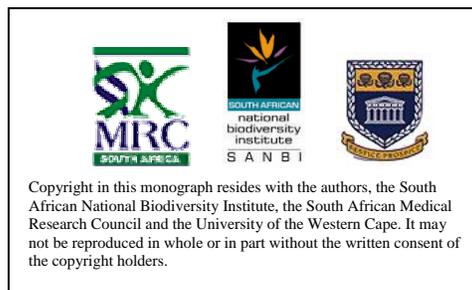
None reported.

## Precautions

No special precautions.

## Dosage

To be determined. The following formulation for a gargle has been used traditionally<sup>3</sup>:  
Juice of sour fig leaves: half a bottle  
Alum: one teaspoonful  
Honey: four tablespoonsful  
Chilli vinegar: two tablespoonsful  
To be mixed and used as a gargle four times daily.



<sup>2</sup> Springfield, E.P., Amabeoku, G., Weitz, F., Mabusela W. and Johnson, Q. (2003). An assessment of two *Carpobrotus* species extracts as potential antimicrobial agents. *Phytomedicine* **10**: 434-439.

<sup>3</sup> Biccard, F.L.C. (1866). *Volksgeneeskunde voor Zuid-Afrika*. Cape Town.