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

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.

Microscopical

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 FeCl₃ solution; tannin idioblasts are also present in a ring round the central vascular strand; calcium oxalate raphides are common and may be up to 120µ 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.

![distribution map](image)

**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)

![TLC plate](image)

**HPLC on C\textsubscript{18} column, method according to Appendix 2b.**

**Major compounds:**

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

![HPLC spectrum](image)

**Total ash: 14.77%**

**Purity tests**

**Assay**
Not yet available

**Major chemical constituents**
The leaves contain flavonoids\textsuperscript{1} (rutin, neohesperidin, hyperoside), catechin, ferulic acid and catechol tannins\textsuperscript{GR1} (19.4 and 14.16%) respectively in dried leaf and stem. Citric and malic acid are present.

![chemical constituents](image)

Hyperoside; \( R = \text{galactosyl} \)
Rutin; \( R = \text{rhamnoglucosyl} \)

![chemical constituents](image)

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* \(^1\). 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\(^2\) 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\(^3\):

Juice of sour fig leaves: half a bottle

Alum: one teaspoonful

Honey: four tablespoonsful

Chilli vinegar: two tablespoonful

To be mixed and used as a gargle four times daily.

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