

# PELARGONIUM BETULINUM HERBA

## Definition

Pelargonium Betulinum Herba consists of the fresh or dried leaves, smaller stems and flowers of *Pelargonium betulinum* (L.) l'Hérit. (Geraniaceae).

## Synonyms

*P. georgense* Knuth

## Vernacular names

maagpynbossie, kanferblaar (A)

## Description

### Macroscopical



Figure 1 – Live plant

Small erect to sprawling semi-woody shrub, 0,3-1,3 metres in height; **leaves** ovate, soft to slightly leathery, 1-3 cm long x 0,7-2,5 cm wide with dentate margin and aromatic camphoraceous odour, glabrous to finely hairy; **flowers** (Aug-Oct) pink to purple, occasionally white, streaked with darker purple, borne in umbels of usually 3-4 flowers; stamens 7, with orange anthers.<sup>1</sup>

<sup>1</sup> Van der Walt, J.J.A. (1977). Pelargoniums of Southern Africa. Vol.1. Purnell, Cape Town.



Figure 2 – line drawing

### Microscopical

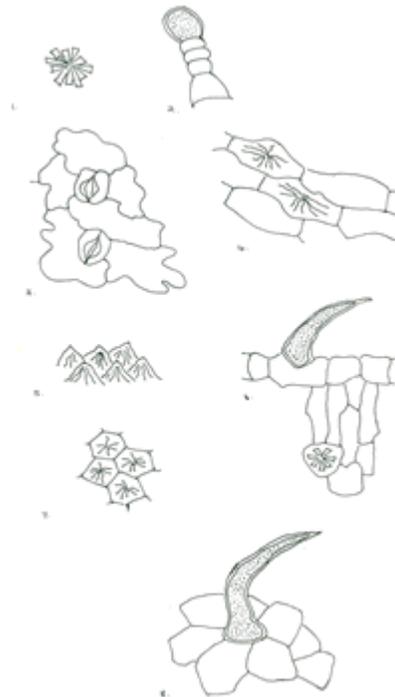


Figure 3 – microscopical features

Characteristic features are: the unicellular clothing hairs, abundant along the leaf margin in some collections, 20-30 $\mu$  long, with slightly thickened warty walls; the more numerous longer unicellular clothing hairs, up to 600 $\mu$  long, of lower leaf surface, particularly over the main veins; the

glandular hairs with multicellular stalks and unicellular heads  $\pm 20\mu$  in diameter, with red-brown contents; the abundant rosette aggregates of calcium oxalate, 40-50 $\mu$  in diameter, forming a crystal layer in the leaf mesophyll or occurring loose in the powdered drug; the fairly abundant triaperturate yellow-brown pollen grains, up to 80 $\mu$  in diameter; the papillate cells of the corolla epidermis; the polygonal to slightly wavy walled cells of upper and lower leaf epidermis; the cells of the palisade layer with red-brown contents.

1. Calcium oxalate rosette aggregate (40-50 $\mu$  diameter)
2. Glandular trichome with unicellular head  $\pm 20\mu$  in diameter, with red-brown contents
3. Leaf epidermis with anomocytic stomata
4. Papillate cells of leaf epidermis
5. Papillate cells of corolla epidermis (lateral view)
6. T/S leaf showing clothing hair and calcium oxalate rosette aggregate in cell of mesophyll

### Crude drug

Supplied in bundles comprising young leaf and stem, sometimes together with flowers; odour pleasantly aromatic and camphor-like; dried powdered drug distinctly red brown in colour.

### Geographical distribution

Sandy dunes and coastal flats of the Western Cape Province.



Figure 4 – distribution map

### Quality standards

#### Identity tests

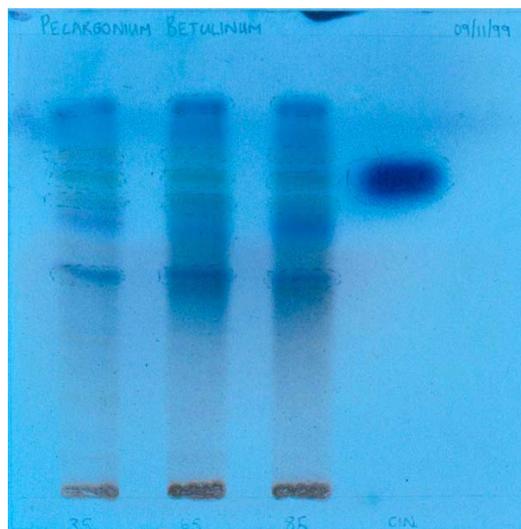


Figure 5 – TLC plate

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<sub>f</sub> values of major compounds: 0,48 (lilac); 0,63 (light sage green); 0,69 (sage green); 0,74 (sage green); 0,85 (lilac); cineole: 0,69 (blue-purple)

HPLC on C<sub>18</sub> column, method according to Appendix 2b.

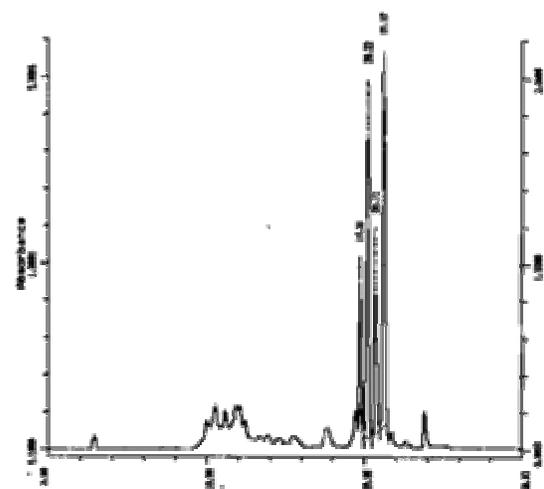


Figure 6 – HPLC spectrum

### Major compounds:

Methanol extract: (Figure 6)  
Retention times (mins): 19.81; 20.22; 20.73;  
21.27

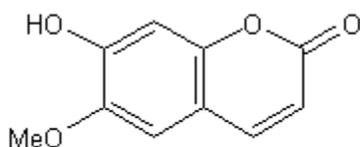
**Ethanol (70%) soluble extractive value:**  
not less than 28% (range: 28.27-31.34%)

### Purity tests

### Assay

Not yet available

### Major chemical constituents



scopoletin (7-hydroxy-6-methoxycoumarin)

### Figure 7 – chemical constituents

Microchemical tests in our laboratories indicated the presence in this species of saponins and tannins but not alkaloids, cardiac glycosides, cyanogens or anthraquinone derivatives.

Coumarins e.g. 7-hydroxy-5, 6-dimethoxycoumarin (umckalin), its 7-glucoside and scopoletin have been identified as major constituents of root extracts of *P. betulinum* as well as of 11 other *Pelargonium* species<sup>2</sup> but do not appear to characterise the above-ground organs of the genus. Tannins (hydrolysable + condensed) and flavonoids, rather than coumarins, appear to be the major secondary constituents of leaf, flower and stem<sup>3</sup>. The indole alkaloids elaeocarpidine and its 20-H isomer epielaecarpidine have

<sup>2</sup> Wagner, H. and Bladt, S. (1975). Coumarins from South African *Pelargonium* species. *Phytochemistry* **14**:2061-2064.

<sup>3</sup> Latté, K-P. (1999). Phytochemische und pharmacologische Untersuchungen an *Pelargonium reniforme* Curt. PhD thesis, University of Berlin.

been identified in leaves of 8 *Pelargonium* species but not in those of *P. betulinum*<sup>4</sup>

Essential oils characterise species of *Pelargonium* Section *Pelargonium*, to which *Pelargonium betulinum* belongs, but little is known at present of the composition of *P. betulinum* oil, or of other constituents of this species.

### Dosage forms

Used mainly in the form of an aqueous infusion, taken internally. The vapours obtained from steaming the leaves in boiling water may be inhaled.

### Medicinal uses

As the vernacular name suggests, infusions of this herb are used to treat colic and gastric disorders; inhalation of the vapours obtained from steaming the leaf is considered beneficial for cough and bronchial congestion.

### Pharmacology/bioactivity

Little is known of the pharmacology of this species. Preliminary assays indicated no *in vitro* antimicrobial activity of aqueous extracts against *Pseudomonas aeruginosa*, *Candida albicans* or *Mycobacterium smegmatis* in the concentrations used in our laboratories. Some activity was recorded against *Staphylococcus aureus*.

Scientific interest in the bioactivity of the genus *Pelargonium* has focused mainly on *P. reniforme* and *P. sidioides*, the roots of which are used traditionally to treat diarrhoea. Under the vernacular name umkcaloabo, their recommended use as a specific for tuberculosis, bronchitis and other pulmonary disorders attracted the attention of the German pharmaceutical industry and a herbal preparation known as Umkcaloabo® (ISO, Regensburg) has been available for some years. Antibacterial, anti-mycobacterial, and immunomodulatory

<sup>4</sup> Lis-Balchin, M.T. (1996). A chemotaxonomic reappraisal of the Section *Ciconium* *Pelargonium* (Geraniaceae). *South African Journal of Botany* **62**(5): 277-279.

activity of whole plant extracts and of isolates has been investigated<sup>2</sup>.

### **Contraindications**

None known.

### **Adverse reactions**

None reported.

### **Precautions**

No special precautions.

### **Dosage**

Eight tablespoonsful ( $\pm 20\text{g}$ ) of dried powdered herb is infused until cold in one litre ( $\pm 6$  teacupfuls) of boiling water. The mixture is strained and taken in half teacupful (90ml) doses three times daily. For nasal or bronchial congestion, fresh leaf should be added to a basin of boiling water and the vapours inhaled.

