

Profile Monograph: *Pelargonium sidoides*

Pelargonium sidoides root

A General aspects

1. General description

Botanical name:

Pelargonium sidoides DC.

Main synonyms: none

Family: Geraniaceae

Vernacular names:

Pelargonium sidoides (English); *Pelargonium sidoides* (French); *Umckaloabo* (German); *Pelargonium sidoides* (Italian)

Geographical distribution: Eastern parts of southern Africa (Eastern Cape Province, Kwazulu-Natal and Lesotho).

Conservation status: not listed.

Description:

A small perennial herb with tuberous rhizomes, rounded to heart-shaped and slightly silky leaves on long petioles, and small tubular flowers that are dark maroon red to almost black. The closely related *P. reniforme* are morphologically very similar but has pink flowers (Van der Walt 1977, Van Wyk & Wink 2004).

Photographs B E van Wyk:



(a) *Pelargonium sidoides* plant



(b)

Pelargonium sidoides flowers



(c) *Pelargonium sidoides* rhizomes (product)

2. 2. Origin and preparation of plant material

Origin: Eastern Cape Province.

Plant parts used: Dried tuberous rhizomes.

Cultivated/wildcrafted: Most of the material is still wild-crafted but crop development has progressed to a point where significant quantities of raw material will soon be produced from cultivated plants.

Preparation/processing: The tuberous rhizomes are simply sliced and dried. Rapid kiln drying yields a better quality product.

Flowering/harvesting time:

The plant flowers over a long period during the summer months. Harvesting usually occurs after the end of the growing season.

B Identification and Quality Control

See introduction for methods used.

3. Plant material investigated:

dried and powdered leaves

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

extractant	water	ethanol	acetone
mg/g	86	72	40
% extracted	8.6	7.2	4.0

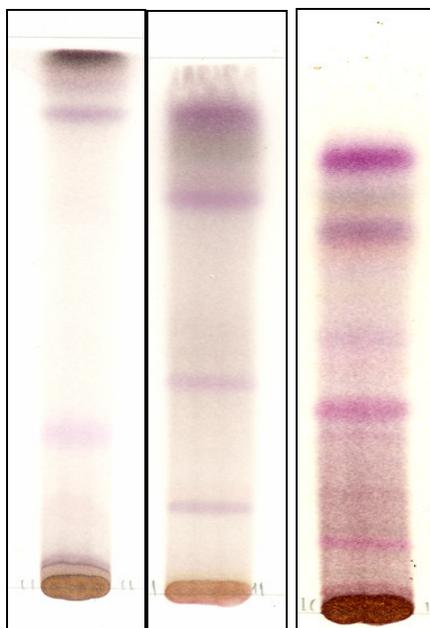
5. Physical characteristics

Yellow-green powdered leaves with a sharp, tangy odour

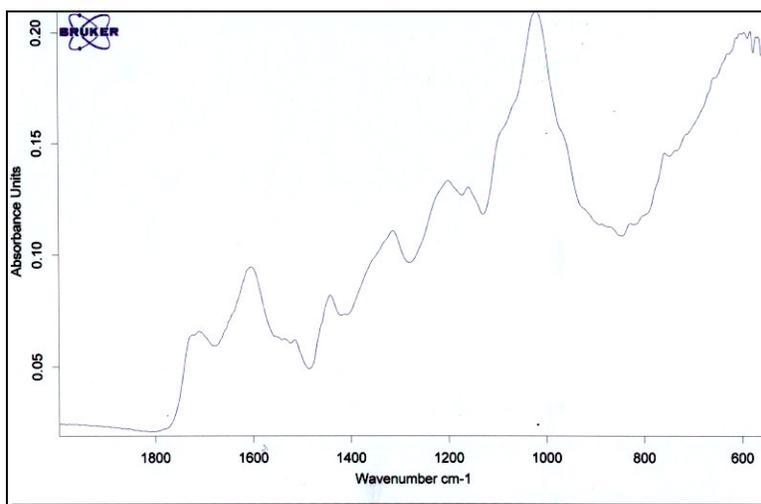
6. Identification by standardized TLC system.

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.



7. Infra red scan of powder.



8. Specialized TLC or HPLC if available.

NA

9. Concentration of active principle if known.

NA

10. Possible adulteration and mistaken identity.

11. Standard specifications based on WHO (1998) guidelines.

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-insoluble ash:

Not more than 1%

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.

12. Specialized TLC or HPLC if available.

General TLC systems for coumarins can be used. No specialized systems for HPLC analysis appear to have been published.

13. Concentration of active principle if known.

The antibacterial and antiviral effects are attributed to gallic acids and other phenolic compounds, while the immunomodulatory activity is ascribed to a combination of phenolic compounds and various coumarins (umckalin and others). No data could be found on concentrations of these compounds.

14. Possible adulteration and mistaken identity.

The dried product may be adulterated with the very similar-looking *P. rheniforme*. Morphological distinction of the dried product is extremely difficult, so that chemical analysis is the only reliable method. Whereas *P. sidoides* contains umckalin and its 7-O-Methylether (=5,6,7-trimethoxycoumarin) as major constituents, these are characteristically low or absent in *P. rheniforme*.

15. 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-insoluble ash:

Not more than 1%

Water-soluble 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 *P. rheniforme*. Easily detected by the absence or virtual absence of umckalin and 5,6,7-trimethoxycoumarin, the marker compounds in *P. sidoides*.

16. Stability of product

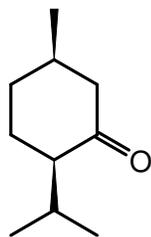
Unknown.

C Use and Efficacy**17. Formulation and dosage**

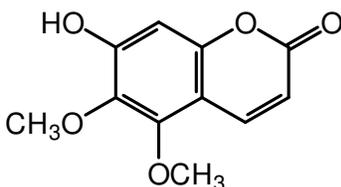
Ethanollic extracts are used in a proprietary herbal tincture known as Umkaloabo™ (said to be a word of Zulu origin?). Infusions or decoctions are traditionally used but dosage information on the crude herb is not available.

18. Chemical constituents according to literature

The dried rhizomes contain at least eight different coumarins, of which umckalin and 5,6,7-methoxycoumarin are considered to be useful marker compounds (Kayser & Kolodziej 1994, 1995, 1997; Kolodziej & Kayser 1998, Kayser *et al.* 2001) The herb also contains gallic acids and methyl esters of gallic acids, as well as flavonoids (quercetin), flavan-3-ols (catechin, gallocatechin) and phytosterols (sitosterol-3-glucoside). Aboveground parts contain a wider diversity of phenolic compounds but no coumarins. Monoterpenoids such as isomenthone (common in *Pelargonium* species) appears to be absent.



(+) - Isomenthone



Umckalin

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

The traditional medicinal uses of *Pelargonium sidoides* are poorly recorded. The plant is traditionally used by Zulu people to treat gonorrhoea, diarrhoea and dysentery. A large number of *Pelargonium* species with tuberous rhizomes are used in traditional medicine against diarrhoea and dysentery and only this use is well documented (Watt & Breyer-Brandwijk 1962, Forbes 1986, Hutchings *et al.* 1996, Van Wyk *et al.* 1997).

20. Known biological activities [bioassays and pharmacological information]

Evidence for immune stimulation (Kayser *et al.* 2001), NO-induction (and antibiotic effects of the proprietary substance Umckaloabo have been published (Kayser & Kolodziej 1997, Kolodziej *et al.* 2003). Recent studies showed significant effects on nasal epithelial cells (Neugebauer *et al.* 2005) and against mycobacteria (Seidel & Taylor 2004).

21. Clinical evidence for efficacy

In a multi-center, non-randomised observational study, it was found that treatment with Umckaloabo significantly reduced the symptoms associated with acute bronchitis in 742 children between the ages of 0 and 12 (Haidvogel *et al.* 1996). Several other, randomised, double-blind, placebo-controlled studies of special extracts on children and adults have followed (Bereznoy *et al.* 2003, Matthys *et al.* 2003).

D Safety

22. Toxicity according to literature and laboratory results [LD50 Brine shrimp assay, cellular toxicity].

An unpublished brine shrimp test indicated complete safety. The observational study mentioned above (Haidvogl *et al.* 1996) also indicates safety (very low incidence of side effects – only 8 of 742 patients).

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

None.

E Evaluation of probable safety

24. Probable safety according to the following criteria based on Goldberg et al. Botanical Safety Handbook:

***Pelargonium sidoides* – 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

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

Acute bronchitis in children ++ (Special extract) (Haidvogl *et al.* 1996)

Acute bronchitis in adults ++ (Special extract) (Matthys *et al.* 2003).

Pharyngitis ++ (extract) (Bereznoy *et al.* 2003).

- ++ 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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