

BALLOTA AFRICANA HERBA

Definition

Ballota Africana Herba consists of the fresh or dried overground parts of *Ballota africana* (L.) Benth. (Lamiaceae).

Synonyms

Marrubium africanum (L.) Benth.

Vernacular names

Kattekruie (A)

Description

Macroscopical¹



Figure 1 –Live plant.

Erect or spreading shrubby perennial to 1.2m in height, with drooping foliage; most parts of the plant are densely clothed with hairs; **leaves** opposite, densely hairy, soft to rough, ovate, 15-50 × 15-45mm, with rounded apex and irregularly crenate margin, **flowers** (May-Nov) purple, pink or mauve, borne in simple or branched inflorescences of many flowered globose verticils, often crowded towards the upper part of the stem, one verticil between each leaf pair; **calyx** hairy, tubular, 10-20 toothed; **seeds** shiny, black, about 2mm in diameter.

¹ Codd, L.E. (1985). The genus *Ballota*. *Flora of Southern Africa* **28**(4): 48-50.

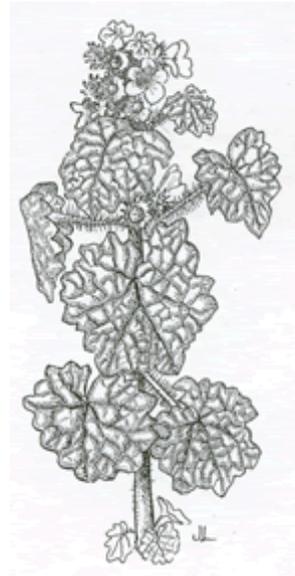


Figure 2 – line drawing

Microscopical

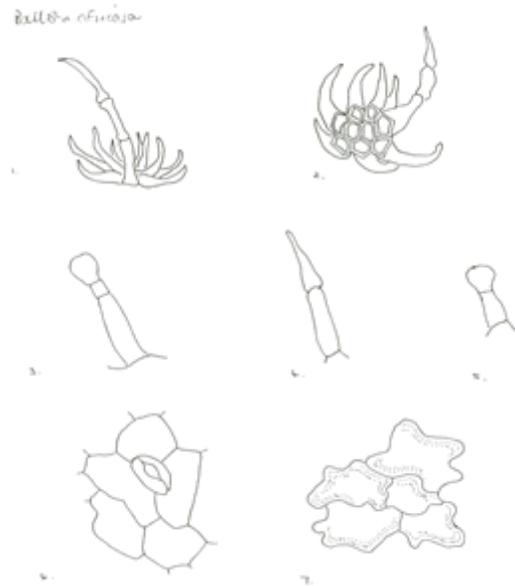


Figure 3 – microscopical features

Characteristic features are: the very numerous clothing hairs of leaf and stem, of two kinds: 1) simple, unbranched, 1-4 celled hairs up to 160 microns long, often with large basal cell; 2) stellate hairs of up to 20 individual components, each 1-4 celled, one hair characteristically much longer than the rest, up to 1.2 mm in length, thin-walled; the abundant glandular hairs of leaf and stem, also of two kinds: 1) short glands with

unicellular stalk and unicellular head up to 40 microns in diameter; 2) longer glands up to 80 microns in length with bicellular stalk and unicellular head; the epidermal cells of the leaf lamina, with sinuous walls and striated cuticle; the single palisade layer of the leaf lamina; the absence of calcium oxalate crystals.

- 1 and 2. Thin-walled stellate hairs of leaf, up to 1.2 mm long, comprising up to 20 individual hairs, each 1-4 celled, one hair characteristically much longer than the rest
3. Glandular hair, up to 80µ in length, with bicellular stalk and unicellular head
4. Simple, unbranched, 1-4 celled clothing hair, up to 160µ long, often with large basal cell
5. Short glandular hair with unicellular stalk and unicellular head up to 40µ in diameter
- 6 and 7. Epidermal cells of leaf lamina with sinuous walls and striated cuticle

Crude drug

Collected as required or available In the marketplace as bundles of fresh or dried material comprising leaves and smaller stems together with occasional flowers and fruits. Texture rough-hairy, odour pleasant aromatic, colour deep green.

Geographical distribution

Widespread on rocky flats and lower slopes from Nieuwoudtville to the Cape Peninsula, Caledon, the Karoo and Namaqualand.

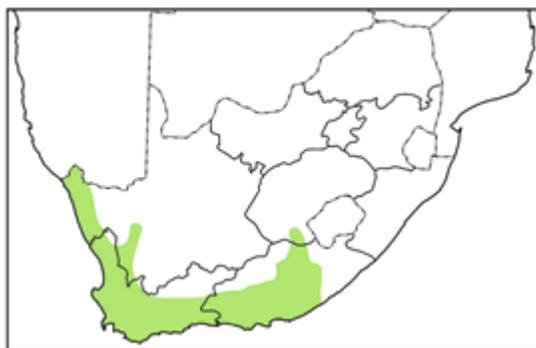


Fig. 4: distribution map

Quality standards

Identity tests

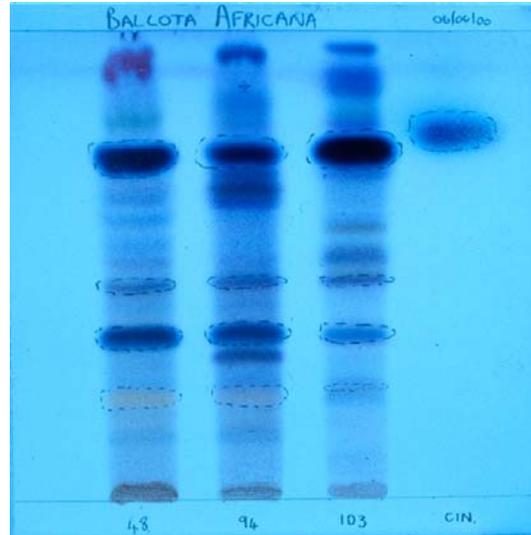


Figure 5 – TLC plate.

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_f values of major compounds: 0,22 (orange); 0,36 (lavender); 0,47 (mauve); 0,75 (royal blue); cineole: 0,79(blue-purple).

HPLC on C₁₈ column, method according to Appendix 2b. (figure 6)

Major compounds:

Methanol extract:

Retention times (mins): 14.73; 18.44

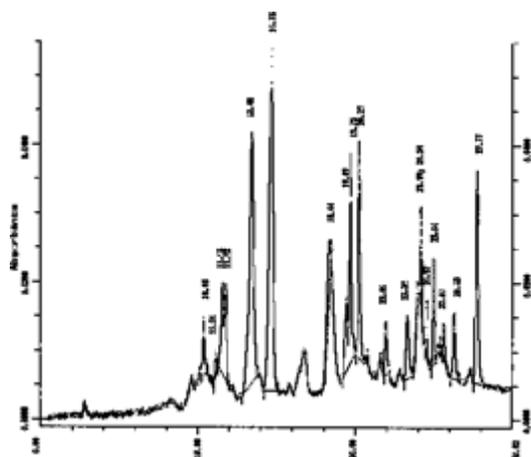


Figure 6 – HPLC spectrum

Ethanol (70%) soluble extractive value:
not less than 26,0% (range: 26.39-29.44%)

Purity tests

Assay

Not yet available

Major chemical constituents

Microchemical tests in our laboratories indicated the presence of saponins and tannins but not alkaloids, cardiac or anthraquinone glycosides. Little information is available in the scientific literature concerning the secondary chemistry of this species. An allied species, the European *Ballota nigra* L. (black horehound), has been the subject of some phytochemical studies^{2 3 4 5} which revealed the presence of labdane type diterpene lactones e.g. ballotenone. *Marrubium vulgare* L. (white horehound), also a closely related species, contains similar diterpene lactones e.g. premarrubiin as well as various flavonoids and pyrrolidine-type alkaloids.⁶

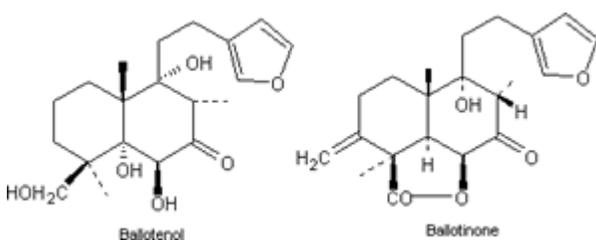


Figure 8: chemical constituents

Dosage forms

An aqueous infusion or decoction is taken orally or may be applied externally as a

² Bruno, M. *et al.* (1986). Preleosibirin, a prefuranic labdane diterpene from *Ballota nigra* ssp. *foetida*. *Phytochemistry* **25**: 538-539.

³ Savona, G. *et al.* (1976). Structure of ballotenone, a diterpenoid from *Ballota nigra*. *J. Chemical Society PerkinTrans.1*: 1607-9.

⁴ Savona, G. *et al.* (1977). The structure of ballotenol, a new diterpenoid from *Ballota nigra*. *J. Chemical Society PerkinTrans.1*: 497-9.

⁵ Savona, G. *et al.* (1977). Structures of three new diterpenoids from *Ballota* species. *J. Chemical Society PerkinTrans.1*: 322-324.

⁶ Henderson, M.S. and McCrindle, R. (1969). Premarrubiin. A diterpenoid from *Marrubium vulgare*. *Journal of the Chemical Society(C)*: 2014.

lotion. A tincture in brandy is prepared by steeping the above ground parts of the plant for several weeks. Steamed leaf is occasionally applied to the chest as a poultice.

Medicinal uses

An ancient Khoi and San remedy, this herb was traditionally used to treat measles and fevers, often in combination with *Salvia* species. Pappe (see GR 19) recorded that the plant had similar properties to white horehound i.e. expectorant, aromatic and bitter tonic and regarded it as a useful remedy for chronic pulmonary disease, persistent cough and asthma. White horehound is the subject of a monograph in the current edition of the British Herbal Pharmacopoeia (BHP) as an expectorant and bitter tonic for digestive disorders. The German health authority has approved the use of white horehound both as an expectorant and as an appetite stimulant and digestive aid. Other traditional uses of *Ballota africana* include the treatment of insomnia or nervous stress, for which purpose it may be mixed with *Valeriana capensis* or *Stachys hispida*. This usage resembles that of black horehound, also a BHP subject, as a sedative, anti-emetic and mild astringent. In some districts *Ballota africana* is used as a remedy for influenza, cough and sprue or applied externally to sores. The latter use is also recommended for white horehound.

Pharmacology/bioactivity

Little pharmacological investigation of this species appears to have been made to date. The related black horehound is similarly poorly known but some information is available concerning the activity of white horehound. Premarrubiin has been found to be an effective expectorant and marrubic acid, derived from premarrubiin, to stimulate the flow of bile in rats (see GR18). Marrubiin has been stated to be cardioactive, possessing anti-arrhythmic properties, although higher doses are said to cause cardiac arrhythmias (see GR17).

No *in vitro* antimicrobial activity of aqueous extracts of South African collections of *A. afra* against *Pseudomonas aeruginosa*,

Candida albicans, *Staphylococcus aureus* or *Mycobacterium smegmatis* was observed, in the concentrations used for disc assays in our laboratories.

The results of an investigation of cytotoxicity and antiviral activity of 16 South African plant species⁷ showed that aqueous extracts of *Ballota africana* were not markedly cytotoxic, at any concentration used in the assay, to HeLa, Vero, Jurkat E6.1, AA-2 and CEM-SS cells. Similar extracts were found to reduce the infectivity of both Cocksackie B2 virus and HSV-1, but only at the higher extract concentrations used. In a direct *in vitro* cell culture antiviral assay however, the replication of neither virus was inhibited.

Contraindications

Both black and white horehound are reputed to affect the menstrual cycle (see GR17). In the absence of chemical, pharmacological and toxicity data, the use of *Ballota africana* during pregnancy is probably best avoided.

Adverse reactions

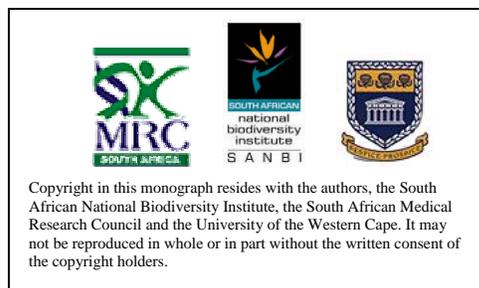
None reported. White horehound is stated to contain an irritant principle, which can cause dermatitis (GR17).

Precautions

No special precautions

Dosage

To be determined



⁷ 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.