MENTHA LONGIFOLIA HERBA

Definition

Mentha longifolia herba consists of the dried aerial parts of Mentha longifolia (L.) Huds. subsp. capensis (Thunb.) Briq. and subsp. polyadrena (Briq.) Briq. (Lamiaceae).

Synonyms

Subspecies capensis
M. capensis Thunb.
M. longifolia (L.).L. subsp. bouvieri (Briq.) Briq.
M. longifolia (L.).L. subsp. capensis (Thunb.) Briq. var. cooperi Briq. ex Cooke
M. longifolia (L.).L. subsp. capensis (Thunb.) Briq. var. doroatophylla Briq.
M. longifolia (L.).L. subsp. capensis (Thunb.) Briq. var. obscuriceps Briq.
M. longifolia (L.).L. subsp. capensis (Thunb.) Briq. var. salicina Burch ex Benth.

Subspecies polyadrena
M. sylvestris L. subsp. polyadrena Briq.

Vernacular names
Wilde kruisement, balderjan (A); koena (S); inxina (Xh); wild mint

Description

Macroscopical

Perennial rhizomatous herb with erect to straggling stems, square in cross section, finely pubescent and up to 1.5m long; leaves simple, opposite, sessile or subsessile, lanceolate (subsp. capensis) or oblong-lanceolate (subsp. polyadrena), up to 90mm long × 22mm wide, finely pubescent on one or both surfaces (subsp. capensis) or glabrous (subsp. polyadrena), with entire to finely dentate margin and acuminate apex; flowers small (corolla 3-5mm long), white to mauve, in clusters forming a tapering cylindrical raceme up to 100mm long × 14mm wide.

Characteristic features are: the numerous clothing hairs of leaf and/or stem, of two types: 1-2 celled, with broad base and sharply tapering apex, up to 50µ long and curved, uniseriate, multicellular hairs, up to 140µ long, sometimes with one cell collapsed; the glandular trichomes of the lower leaf surface with unicellular stalk and globose multicellular (8-12 cells) head, up to 80µ in diameter; the stomata on the lower leaf surface only; the epidermal cells of the lower leaf surface with sinuous walls and more or less polygonal cells of the upper leaf epidermis; the single palisade layer below the epidermis of the upper leaf surface; the sphaerocrystals of calcium oxalate in the epidermal cells of both upper and lower leaf surfaces, smaller in the lower epidermal layer.

1. Polygonal cells of upper leaf epidermis with 1-2 celled curved clothing hair, up to 50µ long
2. Uniseriate, multicellular clothing hair, up to 140µ long
3. Glandular trichomes of lower leaf surface with unicellular stalk and globose 8-12 celled head, up to 80µ in diameter
4. Epidermal cells of lower leaf surface, with sinuous walls
5. Leaf lamina (T/S) showing sphaerocrystals of calcium oxalate in epidermal cells
6. Leaf lamina (T/S)

An extremely variable species with a widespread distribution in Southern Africa, Europe, the Mediterranean region and eastwards into Asia. Subspecies capensis occurs in moist habitats in 5 out of 9 provinces in South Africa: Western, Eastern and Northern Cape, Free State Province and KwaZulu-Natal and also in neighbouring Lesotho. Subspecies polyadena has a more restricted and disjunct distribution: a) at the boundary of the Western and Eastern Cape Provinces between Riversdale and Humansdorp b) Free State Province, northern KwaZulu-Natal, Mpumalanga and North-Western Province, extending into Swaziland and Lesotho. A third subspecies, subsp. wissii (not included here), is confined to the Garies area of Namaqualand and Namibia and is characterised by its extremely narrow leaves, felted on both surfaces.

Quality standards

Identity tests:

Crude drug

Supplied in bundles of young leaf and stem, having a characteristic spearmint-like odour and dull green colour.

Geographical distribution

Figure 4 – distribution map

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 menthol (0.1% in chloroform). Method according to Appendix 2a.

Major compounds

$R_f$ values: 0.34 (yellow); 0.53 (purple); 0.74 (pink); 0.87 (mauve); menthol 0.62 (purple). HPLC on $C_{18}$ column, method according to Appendix 2b.
Major compounds:

**Figure 6a – MeOH HPLC spectrum**

**Figure 6b – DCM HPLC spectrum**

Methanol extract (figure 6a):
Retention times (mins): 20.52; 22.37; 23.15; 24.87; 26.94

Dicloromethane extract (figure 6b):
Retention times (mins): 4.48; 7.07

Ethanol (70%) soluble extractive value: not < 8.0% (range: 7.89-17.47%)

Volatile oil content: not < 1.5% V/W (range: 1.33-2.0%)

**Purity tests**

**Assay**
Not yet available

**Major chemical constituents**

Little is known of the secondary chemistry of the Southern African subspecies of *Mentha longifolia*. Microchemical tests in our laboratories indicated the presence of tannins, saponins and flavonoids but not of alkaloids. Common flavonoids e.g. acacetin, hesperidin, as well as luteolin and apigenin glucuronides have been reported from European populations ².

Overground parts of the plant yield 2.4%³ (our laboratories: 1.33-2.0%) of an essential oil, of which the chief component appears to be the monoterpene ketone carvone⁴ (70% in one South African oil sample and up to 77% in populations, subspecies or varieties from elsewhere). *Mentha longifolia* thus approaches spearmint (*Mentha spicata*) rather than peppermint (*M. piperita*) in oil composition. Other major constituents of the essential oil, according to various studies⁵, include piperitenone and its oxide, piperitone and its oxide and pulegone.

**Dosage forms**

Used mainly in the form of an aqueous infusion, orally, *per rectum* or as a topical

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application. An ointment is prepared from the leaves. Fresh leaf may be inserted into the nostrils or added to boiling water and the vapours inhaled.

**Medicinal uses**

**Internal**

For the treatment of colic, menstrual disorders, indigestion, flatulence, pulmonary infection and congestion, headache, fever, cough, colds and urinary tract infections. A leaf decoction is used as an *inembe* (a traditional preparation taken during the third trimester of pregnancy to facilitate labour, or at term to induce labour).

**External**

To relieve swelling and to treat sores or minor wounds. Leaf/stem may be added to boiling water and the vapours inhaled to relieve nasal or bronchial congestion.

**Pharmacology/bioactivity**

The bioactivity of Southern African subspecies of *Mentha longifolia* does not appear to have been the subject of scientific study. Investigation of populations elsewhere has demonstrated:

**Antimicrobial activity:**

Against the following organisms: *Aspergillus flavus* (aqueous extract), *Bacillus subtilis*, *Streptococcus sobrinus* (ethyl acetate extract), *Staphylococcus epidermidis*, *Escherichia coli* (95% ethanol extract), *Staphylococcus aureus* (95% ethanol and water extracts). In these and other studies no activity could be demonstrated against the following:

1. **Fungi:** *Aspergillus flavus*, *A. fumigatus*, *Scopulariopsis brevicaulis* (water extract)
2. **Yeast:** *Candida albicans*, *C. krusei*, *C. parapsilosis*, *C. pseudotropicalis*, *C. stellatoidea*, *C. vaginalis*, *C. tropicalis*, *Cryptococcus neoformans* (water extract)
3. **Bacteria:** *Bacillus subtilis*, *Escherichia coli*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Salmonella typhosa*, *Shigella dysenteriae*, *Mycobacterium tuberculosis* (water, 80% ethanol, 95% ethanol extracts)

Aqueous extracts from Western Cape populations of *Mentha longifolia*, tested in our laboratories, showed no activity against *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Candida albicans* or *Mycobacterium smegmatis* in the concentrations used.

*In vitro* antimicrobial activity of the essential oil (conc. 20.0%) obtained from Yugoslavian plants was assessed against a number of organisms. 

1. **Bacterial species:** *Bacillus subtilis*, *Escherichia coli*, *Micrococcus flavus*, *Salmonella enteritidis*, *S. typhi*, *Sarcina lutea*, *Shigella sonnei*, *Staphylococcus aureus*, *S. epidermidis*, *Pseudomonas aeruginosa*.

Activity was demonstrated in the same study against 5 fungal species: *Epidermophyton floccosum*, *Microsporum canis*, *Trichophyton mentagrophytes* in seed plants. *Journal of Clinical Investigation* 28: 920-923.


mentagrophytes, T. rubrum and T. tonsurans and one yeast (Candida albicans) (MIC in all cases 8.0 µl/ml).

Mutagenic activity

Ethanolic (95%) extracts at a concentration of 10.0 mg/plate showed weak activity against Salmonella typhimurium TA98 (Number of revertant colonies 20-100) and moderate activity against S. typhimurium TA100 (number of revertant colonies 100-200)12

Cytotoxicity

No cytotoxicity could be demonstrated against Chinese Hamster V79 cells, using methanolic extracts at a concentration of 100mcg/ml. 13

Effects on G-I tract

A phenolic fraction obtained during extraction of the dried aerial parts promoted bile secretion and inhibited intestinal motility in the male mouse, when given intraperitoneally at a dosage of 10,0 ml/kg. The glycoside fraction, at a similar dosage, stimulated intestinal motility. 14

Antioxidant activity

Aqueous-alcoholic extracts of the shade-dried inflorescence showed antioxidant activity (LC50 29.0 mcg/ml) 15

In vitro

Toxicity

The essential oil obtained from a Spanish collection of Mentha longifolia, administered intraperitoneally to the mouse, had an LD50 of 437.4mg/kg16, but toxicological information relating to the whole herb is lacking.

In view of the common occurrence of chemical races in the Lamiaceae17 and the detection of pulegone as a major constituent of the essential oils obtained from some Mentha longifolia populations (see 9.0 above), studies of the composition of South African M. longifolia oils are urgently needed. Recent research suggests that pulegone (d-isomer) is "metabolised in the liver to menthofuran, via a highly reactive metabolite which binds irreversibly to the components of liver cells in which metabolism takes place, quickly destroying the liver"18.

Pulegone (d-isomer) has in addition been shown to rapidly destroy cytochrome P450 in the rat19. It would therefore be prudent for the time being to discourage the use in South Africa of Mentha longifolia, by patients with a history of liver disease or those taking cytochrome P450 inducing drugs e.g. ethanol, content and antioxidant activity of the oil (12.5µg.ml) was not demonstrated 11.
progestagens, phenobarbitone, phenytoin, nitrazepam, carbamazepine and diphenhydramine. Potentially hepatotoxic drugs such as paracetamol, isoniazid, methyldopa and indomethacin should not be taken concomitantly with *Mentha longifolia* preparations.

**Contraindications**

Until such time as the secondary chemistry of indigenous populations of *Mentha longifolia* has been elucidated, and the occurrence of high pulegone races excluded, self-medication during pregnancy with preparations of this herb is not recommended.

**Adverse reactions**

None documented or reported by traditional practitioners and herbalists.

**Precautions**

See 12.0 E above

**Dosage**

**Internal**

An infusion is made by adding one part by volume of fresh herb to four parts by volume of boiling water. Allow to cool, strain and refrigerate. If dried material is used, the infusion should be made with one part by volume of herb to ten parts by volume of boiling water.  
Adults: half a teacupful (90ml) three times daily  
Children 2-12 years: one quarter teacupful (45ml) three times daily  
Infants: one tablespoonful (10ml), diluted with boiled cooled water, three times daily.

**External**

An infusion, prepared as described above, may be applied to the skin. A handful of fresh leaf, placed in a bowl of boiling water, may be used as an inhalation. Treatment may be continued for one week. If symptoms persist, additional or alternative therapy should be sought.