**TETRADENIA RIPARIA HERBA**

**Definition**

Tetradenia Riparia Herba consists of the fresh or dried leaf and smaller stems of *Tetradenia riparia* (Hochst.) Codd (Lamiaceae).

**Synonyms**

*Iboza bainesii* N. E. Br.  
*Iboza galpinii* N. E. Br.  
*Iboza riparia* (Hochst.) N. E. Br.  
*Moschosma riparium* Hochst.

**Vernacular names**

Iboza, ibozane (Z), watersalie (A), ginger bush

**Description**

Figure 1: Live plant (male flowers)

**Macroscopical**

Soft much-branched dioecious shrub or small tree 1-3m in height, with brittle, semi-succulent stems and sticky-aromatic foliage; leaves petiolate, ovate-oblong to round, 35-80 × 35-70mm, sparsely to densely glandular-pubescent on both surfaces, margin coarsely crenate to dentate, variable in size, shape and degree of hairiness; flowers (May-Aug) in large branched terminal panicles, the male flower-spikes longer than the female, small (corolla 3-3.5mm long), white to pale mauve.

**Figure 2: line drawing (female flowers)**

**Microscopical**

Characteristic features are: the cells of the lower leaf epidermis with sinuous walls and numerous anomocytic stomata (1); the polygonal cells of the upper leaf epidermis with occasional stomata and underlying

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palisade layer (4); the numerous glandular hairs of leaf and stem, of two types: those with 2-3 celled stalk and unicellular head, up to 650µ in length, raised on papillae (5), particularly abundant on main leaf veins and those having a unicellular stalk and bicellular head up to 25µ in diameter, filled with yellow-brown contents (3); the uniseriate clothing hairs of both leaf surfaces, up to 800µ long, thin-walled, smooth, 2-3 cells long, with swollen base (2); the micro-rosettes of calcium oxalate, 10-12µ in diameter, in cells of the leaf palisade and mesophyll (6).

**Crude drug**

Best collected when required, as material blackens rapidly after harvesting and dries with great difficulty; odour pleasant, highly aromatic, texture soft, foliage extremely sticky and strongly scented, stems soft and semi-succulent.

**Geographical distribution**

Wooded hillsides and stream banks of coastal KwaZulu/Natal, Mpumalanga and the Northern Province of South Africa; also northern Namibia, Angola, Botswana and east tropical Africa.

![Figure 4: 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. Rf values of major compounds: 0, 36 (grey); cineole:0.79 (light blue)

![Figure 5: TLC plate](image)

HPLC on C18 column, method according to Appendix 2b.

![Figure 6: HPLC spectrum](image)

**Major compounds:**
Methanol extract:
Retention times (mins): 3.54; 3.73; 7.42; 9.91
Ethanol (70%) soluble extractive value: not less than 2.0% (range: 1.96-2.29%), determined using fresh material (15.0g) extracted with 200ml 70% ethanol, of which 50ml aliquots were taken (method according to the BHP 1996).

**Purity tests**

**Assay**

Not yet available
Major chemical constituents

1. diterpenes e.g. ibozol, 7 α-hydroxyroyleanone, 8 (14), 15-sandaracopimaradiene-7α,18-diol
2. α-pyrone s, e.g. umuravumbolide, tetradenolide
3. essential oil (1.9%) of which the main components are: α-terpineol (22.6%), fenchone (13.6%), β-fenchyl alcohol (10.7%), β-caryophyllene (7.9%) and perillyl alcohol (6.0%)
4. phytosterols

Figure 7: chemical constituents

Dosage forms

An aqueous infusion or decoction is taken orally.

Medicinal uses

Used throughout its range as a traditional remedy for cough, respiratory problems, stomach ache, diarrhoea, dropsy, angina pectoris, fever, malaria and dengue fever, yaws, headache, toothache and as an antiseptic.

Pharmacology/bioactivity

Moderate antimalarial activity of the leaf essential oil against two strains of Plasmodium falciparum has been reported.

The diterpene diol 8 (14), 15-sandaracopimaradiene-7α,18-diol has been shown to possess papaverine-like antispasmodic activity on methacholine, histamine and barium chloride-induced contractions of guinea pig ileum as well as on noradrenaline-induced contractions of rabbit aorta.

Leaf extracts (80% ethanol), tested for antimicrobial and antiviral activity, inhibited the growth of Staphylococcus aureus, Candida albicans, Mycobacterium smegmatis, Microsporum canis, Trichophyton mentagrophytes and Bacillus subtilis.

No antiviral activity against Coxsackie virus, poliovirus (unspecified), measles virus and Semliki-Forest virus was demonstrated in these studies. Some of the observed antimicrobial activity has been attributed to the presence of diterpenes.

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In an *in vitro* screen for antibacterial activity of hexane, ethanol and water extracts of South African plants, no inhibitory activity against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli* or *Klebsiella pneumoniae* was demonstrated.\(^{12}\)

An *in vitro* study of the effects of methanolic extracts of fruit, leaf, stem and root on skeletal (toad *rectus abdominis*), smooth (guinea pig ileum) and uterine (non-pregnant guinea pig) muscle\(^ {13}\) showed weak activity on uterine muscle and on smooth muscle relaxation, but strong to moderate activity on smooth muscle stimulation and on skeletal muscle. In the same study, hyper- and hypotensive effects of the extracts were tested *in vivo* in the rabbit, but no activity was observed in the dose used (5mg/kg IV). The general toxicity of the extracts was assessed *in vivo* in the mouse (dose 1.0g/kg IP); toxic effects were recorded for root and fruit extracts but not for leaf or stem extracts.

Insecticidal activity of methanolic extracts (50mg/ml) of fresh and dried leaf, root and stem was assessed *in vitro*, using inhibition of oviposition in *Rhipicephalus appendiculatus* as a measure of acaricidal activity. None of the extracts was found to inhibit oviposition.\(^ {14}\)

**Contraindications**

None known

**Adverse reactions**

There is a single published report concerning the toxicity of this species\(^ {15}\) and dealing with several cases of poisoning, all of which occurred in adult males. The data were collected during 18 years of clinical practice amongst Zulu communities across a wide geographical and sociocultural range.

The symptoms included a severe toxic inflammatory response of mucous membranes, conspicuous at all body orifices. In more severe cases this went on to necrosis and large scale sloughing. A second symptom was profuse salivation; in one case an amount in excess of 5 litres of saliva was produced in 24 hours. In all cases of terminal illness, urine and stools consisted of almost pure blood, were dark in colour and contained shreds of exfoliated mucous membrane. Patients who were fatally ill went into anuria during the last 24-48 hours, but one man recovered after 24 hours of anuria. Most of the patients presenting with these symptoms had taken *Tetradenia riparia* as a cold or flu remedy, in every case exceeding the traditional dose and deviating from the accepted method of administration.

**Precautions**

No special precautions if used in the traditional manner

**Dosage**

To be determined


