Gasteria croucheri (Hook. f.) Baker (Asphodelaceae): a synthesis and review of its medicinal potential

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Abstract
Gasteria croucheri is a valuable succulent perennial herb widely used as herbal medicine in South Africa. This study reviewed medicinal uses of G. croucheri so as to provide baseline data required in evaluating the therapeutic potential of the species. Relevant information on medicinal uses of G. croucheri was collected from electronic scientific databases such as ScienceDirect, SciFinder, PubMed, Google Scholar, Medline, and SCOPUS. Pre-electronic literature search of conference papers, scientific articles, books, book chapters, dissertations and theses was carried out at the University library. Literature search revealed that G. croucheri is used mainly as a protective charm against evil spirits or lightning. The leaves and whole plant parts of G. croucheri are used as blood purifier, emetic, purgative, tonic wash, induce vomiting and herbal medicine for skin problems such as ringworm, skin rash and warts, diarrhoea, hysteria, paralysis and rheumatism. There is need for detailed scientific investigations aimed at elucidating the chemical, pharmacological and toxicological properties of G. croucheri.

Keywords: Asphodelaceae, Gasteria croucheri, South Africa, traditional medicine, Xanthorrhoeaceae

INTRODUCTION
Gasteria croucheri (Hook.f) Baker is a succulent herbaceous perennial belonging to the Asphodelaceae or Aloe family. The family Asphodelaceae has had a complex history and at some stage referred to as Xanthorrhoeaceae.1-5 based on recommendations made by the Angiosperm Phylogeny Group.6 The family name Asphodelaceae has been conserved over Xanthorrhoeaceae based on arguments presented by the Angiosperm Phylogeny Group.7 Members of the Asphodelaceae family are known to be used medicinally as a purgative, as herbal medicines for arthritis, eczema, skin irritations, burns, hypertension and stress.8 Species of the Asphodelaceae family are also widely used as traditional medicines in Algeria, Cyprus, Egypt, India, Libya, Pakistan, Palestine, Spain and Turkey for burns, wounds, colds, earache, eczema, microbial infections, inflammatory disorders, haemorrhoids, jaundice, nephritis, parasitic infections, peptic ulcers, rheumatism and skin diseases.8-30 Research carried out by Malmir et al.30 revealed that crude extracts and compounds isolated from the species of the Asphodelaceae family are characterized by anti-inflammatory, antimalarial, antimelanogenetic, antimicrobial, antioxidant, apoptotic, antiparasitic, antiviral, cytotoxicity, diuretic and hypotensive activities. The genus Gasteria Duval consists of herbaceous succulent perennials with roots that are cylindrical or rarely fusiform.31 About 35 taxa of Gasteria are recognized confined to South Africa, mainly in the Eastern and Western Cape provinces with one species, G. pillansii Kensit extending its distribution into Namibia.33,34 Flowers of two Gasteria species have traditionally been consumed by local people in South Africa. The buds of G. brachyphylla (Salm-Dyck) Van Jaarsw. were reported to be cooked by the early Khoi people as rice, hence the vernacular name “hottentotsrys”.35,36 Gasteria disticha (L.) Haw. flowers are stripped from the flowering stalks and cooked as vegetables.36,37 The Gasteria species flowers are full of nectar and are usually eaten when raw.36 Van Wyk38 argued that these edible Gasteria species can be used as novel fresh salad ingredients particularly young and fleshy flower parts which can be used for this purpose. Gasteria species such as G. bicolor Haw. and G. croucheri are used as traditional medicines.39-49 However, G. croucheri is threatened with extinction, categorized as Vulnerable due mainly to the decline in the number of mature individual plants over the years as a result of high rates of harvesting for the medicinal plant trade. Other Gasteria species that are threatened with extinction include G. armstrongii Schönfeld (Critically Endangered), G. batesiana G.D. Rowley var. batesiana (Near Threatened), G. disticha (L.) Haw. var. langebergensis Van Jaarsw. (Endangered) and G. pillansii Kensit var. hallii Van Jaarsw. (Endangered).51-55 Despite the threats G. croucheri is currently facing in the wild, the species is an important indoor ornamental plant in South Africa, India and other parts of the world.56-59 Given its importance as both ornamental, traditional medicine and also the fact that the species is threatened with extinction, G. croucheri has been selected to be a component of the systematic conservation planning of the eThekwini Municipality in the KwaZulu Natal province in South Africa.60 Systematic conservation planning is important for identifying areas, landscapes and species that are important for retaining habitat quality, conservation of biodiversity and the ecosystem services provided by biodiversity to the benefit of citizens of the eThekwini Municipality.65 Gasteria croucheri is among the top ten most traded or used medicinal plants in the Cape Peninsula region in the Eastern and Western Cape provinces in South Africa.61 The leaves and whole plant parts of G. croucheri are sold in informal herbal medicine markets in Gauteng, KwaZulu Natal, Eastern Cape and Western Cape provinces in South Africa.41,62-68 Research by Philander et al.66 revealed that G. croucheri is managed and cultivated in home gardens of the Western Cape province where the species is required for sustained utilization as herbal medicine but also as a tool for combined biodiversity conservation and poverty alleviation through income generated through its marketing in informal herbal medicine markets. It is
within this context that this review was undertaken aimed at reviewing the medicinal uses of *G. croucheri* so as to provide baseline data required in evaluating the therapeutic potential of the species.

**Botanical profile of Gasteria croucheri**

The generic name *Gasteria* is derived from the Greek word “gaster” which means “belly” in reference to the inflated lower perianth tube of the species. The species epithet “croucheri” is in honour of Mr Joseph Croucher (1838-1917), head gardener and Superintendent at Kew Gardens and succulent specialist. *Gasteria croucheri* is subdivided into three subspecies, namely *G. croucheri* subsp. *croucheri*, *G. croucheri* subsp. *pendulifolia* (Van Jaarsv.) Zonn. and *G. croucheri* subsp. *pondoensis* N.R.Crouch, Gideon F.Sm. & D.G.A.Styles,

The English common names of *G. croucheri* include “forest gasteria”, “forest ox-tongue” and “Natal gasteria”. *Gasteria croucheri* is a solitary or cluster-forming perennial succulent plant growing to a height of 60 cm. in coastal areas of the summer-rainfall regions of the sandstone rock formations, rocky outcrops in subtropical spreading, flat-topped flower stalks. an excentric keel. The flowers are tubular borne on a surface smooth with white spots, the lower surface having inhibitory concentration (IC50) value of 72.0 μg/ml.87 Monoamine oxidase inhibition

Stafford et al.85 evaluated monoamine oxidase inhibition activities of ethanol root extract of *G. croucheri* using a peroxidase-linked photometric monoamine oxidase inhibitor bioassay with clorgyline and selegiline as positive controls. The extract exhibited good monoamine oxidase-B inhibition activities with half maximal inhibitory concentration (IC50) value of 72.0 μg/ml.85

Serotonin reuptake transport protein

Nielsen et al.88 evaluated the serotonin reuptake transport protein activities of aqueous and 70% ethanolic leaf extracts of *G. croucheri* using an in vitro serotonin reuptake transport protein binding assay. Both aqueous and 70% ethanolic extracts exhibited low concentration-dependent inhibition activities.88

### Table 1: Medicinal uses of Gasteria croucheri

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Future research and perspectives

This review showed that *G. croucheri* is a valuable plant species in South Africa. The plant species is used as an ornamental plant and also as an important source of traditional medicines used to treat and manage a wide spectrum of human ailments. This detailed report on medicinal uses of *G. croucheri* indicate that plant species are valuable sources of ethnomedicines. This review strengthens the firm belief that traditional indigenous knowledge represent not only an important heritage, developed over the centuries, but also considerable mass of data that should be exploited in order to provide new and useful knowledge on plant resources. It is therefore, necessary to preserve this indigenous knowledge on traditional medicines by proper documentation, identification of plant species used, herbal preparation and dosage. From a chemical, pharmacological and toxicological point of view, *G. croucheri* has not received any major emphasis. Currently, there is not yet enough data on ethnopharmacological evaluations on the species that can be correlated with its medicinal applications. Therefore, detailed phytochemical, pharmacological and toxicological studies of *G. croucheri* are recommended. Therefore, future research should aim at establishing the link between the phytochemistry, biological activities and the medicinal applications of *G. croucheri*

Conflict of interest

The author declares that he has no conflict of interest.

Acknowledgements

I would like to express my gratitude to Mbeki Research and Development Centre (GMRDC), University of Fort Hare for financial support to conduct this study.

REFERENCES


