



# *Ansellia africana* (Leopard orchid): A medicinal orchid species with untapped reserves of important biomolecules—A mini review



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## ABSTRACT

*Ansellia africana* Lindl., the “Leopard orchid” is a species endemic to Africa. Its ethnobotanical usage has been documented in various traditional African pharmacopeias. It has activity on the Central Nervous System (CNS) and has shown potentiality in the treatment of Alzheimer's disease. However, due to over-exploitation and habitat destruction, the plant is facing the risk of extinction and it has been categorized in the red list of plants as “vulnerable” by IUCN. To protect the remaining natural populations of *A. africana*, a sustainable conservation strategy coupled with systematic scientific exploration of its medicinal potential is of utmost importance. Coupled with this, the advances made in the field of plant metabolomics and transcriptome data mining of putative plant genes will throw more light in understanding the secondary metabolite biosynthesis in this medicinal plant. This article briefly reviews the botany, pharmacology, biochemistry and scope of future research of this important medicinal orchid species. As there is very little literature available on the scientific documentation of the African, especially South African medicinal orchids, we are attempting to compile and document information on different aspects of *A. africana* and highlight the need for research and development on the ethno-pharmacology of this medicinal orchid species.

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## 1. Introduction

The Orchidaceae is one of the world's largest angiosperm families of flowering plants. Coupled with their tremendous horticultural importance, orchids have been used in various traditional pharmacopeias for

centuries (Hossain, 2011). Advances in research of medicinal plants and especially orchids have resulted in the discovery of various active metabolites which have shown potentiality in the treatment of chronic disorders. The phyto-constituents obtained from orchids have shown potential as anti-rheumatic, anti-inflammatory, anti-carcinogenic, anti-convulsive, diuretic, neuroprotective, relaxation, anti-aging, wound healing, hypoglycemic, anti-tumor, anti-cancer, anti-microbial and antiviral activities (Miyazawa et al., 1997; Bulpitt, 2005; Gutiérrez, 2010;

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Hossain, 2011; Pant, 2013). Research in recent years have led to the isolation of various active principles from orchids such as anthocyanins, orcinol, hircinol, cypripedin, bibenzyl derivatives, phenanthrenes, jibantine, nidemin and loroglossin which are present in leaves, pseudobulbs, roots and flowers or in the whole plant (Okamoto et al., 1966; Ye et al., 2002; Bulpitt et al., 2007; Pant, 2013). The above findings largely emphasize that knowledge of different ethno-pharmacological reports on traditional medicinal systems, especially orchids, helps to provide a more pragmatic research approach. This makes the chances of drug discovery much more comprehensive than with random collection.

Like in other traditional pharmacopoeia of the world, orchids also form an integral part of the African traditional medicinal system. However, there are no authentic reports of the exact time when the Africans started to use orchids as medicine (Chinsamy et al., 2011; Hossain, 2011). In South African traditional pharmacopoeias, approximately 49 orchid species are being used (Hutchings et al., 1996; Germishuizen and Meyer, 2003). Amongst the various orchid species used, *Ansellia africana* (Fig. 1A) deserves special mention for its broad-spectrum of medicinal properties especially for its activity on the Central Nervous System (CNS). Coupled with an existent lacunae on systematic studies of medicinal orchids of southern Africa, there is also very little research on the identification and diversity amongst the various natural populations of *A. africana* and its related species. This severe deficiency of documented scientific reports in the related research domain raises the need for a systematic study of the species, concentrating on the aspects of their conservation and mining down its ethno-pharmacological attributes for potential medicinal activities.

### 1.1. *Ansellia africana*—the plant

*A. africana* is an epiphytic orchid, growing in spectacular clumps on trees in the subtropical areas of southern Africa (Fig. 1A). The roots, which anchor the plant to the tree, are specially adapted to absorb water and nutrients very quickly. Unlike other epiphytic orchids, the most characteristic feature of *A. africana* is the needle-like roots pointing upwards which forms a dense mass around the pseudobulbs and which collects senescing leaves and detritus upon which the plant feeds (Fig. 1B). The plant flowers during the dry winter months producing a mass of yellow or greenish yellow blooms, which can be lightly or heavily marked with brown spots. It is found in tropical Africa and into Namibia, Botswana, Swaziland, and in South Africa in the Northern Province, the Lowveld and KwaZulu-Natal, mainly in hot, dry river valleys (Vasudevan and Van Staden, 2011).

### 1.2. Medicinal uses of *A. africana*

Traditionally, stem infusions are used by the Zulu as antidotes to bad dreams. Smoke from burning roots is inhaled for the same purpose (Hutchings et al., 1996) whereas the leaves and stems are used to make an infusion for treating madness in the Mpika district of Zambia (Gelfand, 1985). It is also used for various protective charm purposes and as an aphrodisiac in Zimbabwe (Gelfand, 1985). Recent studies have shown that *A. africana* has potent anti-acetylcholinesterase activity and can be used as an important source of various biomolecules for the treatment of Alzheimer's disease (Table 1) (Chinsamy et al., 2014).



Fig. 1. (A) Photograph of *A. africana* (B) growing *A. africana* plants with needle-like roots pointing upwards (C) shoot originating from PLB (bar = 2 cm) (D) greenhouse acclimatized plants of *A. africana*.

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