

# MOLECULAR STUDIES AND PHARMACOLOGICAL ROLE OF SUTHERLANDIA FRUTESCENS

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**Abstract:** Sutherlandia (Fabaceae) are reported in literature to possess pharmacological activities. Species of Sutherlandia exhibit excellent economic medicinal value and have found in traditional medicine. It contains 11 species accepted species that are extensively used for the treatment of cancer, AIDS, diabetes and communicable disease in South Africa. During this article, literature searches performed using research project engine and database. (Google scholar, Pub Med, Science Direct.). Several phenolic compounds, flavonoids, alkaloids and triterpenoid glycoside derivatives contribute to the quantitative, chemo typic variation within and between the species as observed. The identification of those compounds using advanced chromatographic techniques (UPLCeMS) and chemo-metric analysis results in a far better understanding of the phytochemical variation of Sutherlandia which may aid in internal control of staples, phytomedicines and commercial herbal products.

**Keywords:** Ant diabetic, Anti-oxidant, Anti-cancer, Anti-inflammatory, Anti thrombotic, Anti -HIV, Analgesic activity, Anticonvulsant, Muscle Relaxant.

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## 1. INTRODUCTION

SUTHERLANDIA FRUTESCENS is medicinal plant extensively utilized in South Africa to treat a spread of health conditions. It is a reasonably widespread, drought-resistant plant grows within the western, eastern and Northern Cape provinces and a few areas of Kwazulu-Natal, varying in its chemical and genetic makeup across these geographic areas. It is widely used as a traditional medicine. Extensive scientific studies are being administered on the security, quality and therefore the efficacy of this medicinal plant to validate the normal claims, elucidate the bioactive constituents. (Van Wyk and Albrecht 2008)

### Description

S. frutescens may be a medium-sized shrub, with fine grayish-green leaves and red, butterfly-shaped flowers. Its seedpods are large and balloon-like with a rather reddish tint. It's a medicinal plant, mostly harvested wild, but It's also grown in community gardens and commercially on a little number of farms. The plant has quite 25 recorded names. Some are associated with the color and shape of the plant's flowers, like kalkoenbos (turkey bush), hoenderbelletjie (the wattle of a cockerel), eendjie (duckling); to its seedpods, like blaasbossie. Port Elizabeth within the Eastern Cape Province started small scale cultivation and commercialization in 1990, when air dried leaves supplied to health shop. Large scale production initiated by the corporate called Phyto Nova (Pty). (Aboyade, Styger et al. 2014)

**Table 1: Classification of Sutherlandia frutescens**

Kingdom	Plantae
Order	Fabales
Family	Fabaceae
Subfamily	Faboideae
Genus	Sutherlandia
Species	frutescens

**Table 2: species of Sutherlandia:(Gericke 2002)**

Name of the species	Family	Habit	Height	Morphological Characters (related to size, shape and color of the flower)
<i>Sutherlandia frutescens</i>	Fabaceae	Erect to procumbent	0.3-1.5m	It is a legume shrub with small leaves and flowers and characterized by balloon-like pods as fruits. The leaves taste slightly bitter and have an aromatic smell. The flowers have a “tubular-like” shape and a bright red orange colour
<i>Sutherlandia montana</i>	Fabaceae	Erect	0.8-1m	Pinnate leaves and axillary racemes of showy, pea-like flowers over a long period, followed by inflated seed capsules
<i>Sutherlandia humilis</i>	Fabaceae	Procumbent to Prostate	< 0.2m	
<i>Sutherlandia microphylla</i>	Fabaceae	Erect	0.8-2.5m	It consists of oblong pods (length to width ratio of more than 2) and narrow leaflets
<i>Sutherlandia tomentosa</i>	Fabaceae	Erect to procumbent	0.6m	It has slightly notched leaflets as opposed to the deeply emarginated leaflets in the latter and the less densely pubescent upper surfaces of the leaflets (with the lamina visible between the hairs).
<i>Sutherlandia speciosa</i>	Fabaceae	Procumbent	0.5m High	Large flowers, bright red with white streaks, long pedicels, lobes, semi-translucent glabrous, fruit ovate, large flowers and fruits with its unique stipe orientation.

**Table 3: parts of plants with chemical constituents**

Parts of plant	Amino acids in high amount
1. Stem	L- arginine
2. Young sticks	L- asparagine
3. Flowers	L- asparagine
4. Mature seeds	Glutamic acid
5. Young seeds	L- asparagine, proline, L arginin

### Flavonoids, Terpenoids, Tannins, Saponins and Others

The presence of sutherlandins and sutherlandiosides (A, B, C, D) within the *Sutherlandia frutescens* extract and also reported the presence of flavonoids and terpenoids compounds (responsible for anti-cancer activity) by using LC-MS, reported the presence of phenolic compounds, flavonoids, alkaloids and saponins and also confirmed the presence of tannins, phlobatannins and therefore the presence of Cyanogenic Glycosides was also found in *L. frutescens* by Keller-Kiliani Test (responsible for muscle relaxant). Many studies proved the presence of steroids

## 2. METHODOLOGY

An extensive literature search related to *Sutherlandia frutescens* conducted on to gather all relevant information about traditional uses, phytochemicals and pharmacological activities. Databases and primary source were gathered from Google Scholar, Pub Med and science direct. Searching for regarding information on the genus *Sutherlandia* 11 species were found. In which 6 of them were accepted. (Shaik, Singh et al. 2011)

“*Sutherlandia frutescens*”

“*Sutherlandia humilis*”

“*Sutherlandia microphylla*”

“*Sutherlandia montana*”

“*Sutherlandia speciosa*”

“*Sutherlandia tomentosa*”

The extracted data includes plant names, uses, purified compounds and pharmacological activities. The chemical constituents are classified according to the chemical groups and their molecular structures were drawn using “ChemDraw”.

### Traditional Uses

Analysis of scientific literature suggested that species of *Sutherlandia frutescens* are extensively used in local and traditional medicine for treatment AIDS, TB, Cancer, Heartburn, Gastritis, Reflux Esophagitis, Peptic ulceration, Hot flushes and irritability in Menopause, Anxiety, Depression, Osteoarthritis and Rheumatoid arthritis. Additionally, they have been used in inflamed wounds, eye infections etc. (Fasinu, Gutmann et al. 2013)

**Table 4: Traditional uses of *Sutherlandia frutescens***

Scientific Name	Common Name	Distribution	Traditional Use	References
<i>Sutherlandia frutescens</i>	Cancer Bush	South Africa, Lesotho, Southern Nambia, South Eastern, Botswana	AIDS, Tuberculosis, Cancer, Depression, and other diseases, Esophagitis, Osteoarthritis <b>Local</b> Tonic with a bitter taste Gaining weight In HIV patients, it improves appetite and CD4 level.	(Van Wyk and Albrecht 2008)
<i>Sutherlandia microphylla</i>	Grootgansiesbos	Southern Africa	Fever, indigestion, gastritis, peptic ulcer, dysentery, cancer (prevention and treatment), hyperglycemia, respiratory problems, cough, bronchiolitis, kidney and liver problems, gout, heart failure	(Wilcock, Van Niekerk et al. 2004)
<i>Sutherlandia tomentosa</i>	Eendijies or Rooikeurtije <b>Present</b> Lessertiacanescens	Cape coast	Poor appetite, indigestion, stomach problems, dysentery, colds, influenza, kidney problems, fever, diabetes, internal cancers, uterine	

			problems, liver problems, sciatica, rheumatoid arthritis, urinary tract infections, stress and anxiety, and heart failures	
Sutherlandia humilis	Cancer Bush	Eastern Cape	It's used for a variety of reasons, from weak appetite to cancer prevention and therapy	(Olivier, Albrecht et al. 2009)
Sutherlandia montana	Kankerbos	Eastern Cape	Cancer, fever, diabetes, kidney difficulties, rheumatism, and stomach illnesses are all treated by this herb.	(Alimi and Ashafa 2017)
Sutherlandia speciosa	Bitterblaar	Southern Nambia, Northern Cape	Used to treat fever, diabetes, stress, depression, cancer, and other illnesses.	(Xaba 2007)

### 3. CONCLUSION

*S. frutescens* is increasingly understood and studied as a phytomedicine which will potentially be used for people that are HIV positive but who don't yet qualify for antiretroviral treatment (i.e., to fill the treatment gap). This can happen as long as the clinical trails show that *Sutherlandia* is safe, is of excellent quality, and demonstrates efficacy. At an equivalent time, greater collaboration between traditional health practitioners and scientists enhances insights into the utilization, preparation, therapeutic possibilities and pharmaceutical make-up of this plant medicine. In this way, lore and science intersect in new and original ways.

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