

Bioprospecting potential of *Securidaca longepedunculata*

For Access and Benefit Sharing



Securidaca longepedunculata

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October 2016

1. Introduction

Ethiopia is lucky to be gifted with rich biodiversity and traditional knowledge that could pioneer successful bioprospecting. However, like any other developing countries, Ethiopia lacks technical expertise and monetary resources to explore them significantly. The only option for Ethiopia is to collaborate with the developed nations or domestic investors and interested pharmaceutical, cosmetics and other companies alike and jointly explore them strategically and wisely. In doing so, the model of cooperation should be such that it builds the science infrastructure within, preserve and protect the local traditional medicinal and other knowledge reducing the brain drain, and equally share the outcome of the joint projects.

The Ethiopian Biodiversity Institute (EBI) is the nationwide capable authority through ABS Directorate playing the practical role of the Nagoya Protocol on Access and Benefit Sharing of Genetic Resources and Associated Traditional Knowledge. Ethiopia has the officially permitted outline for the implementation of the ABS. The laws concerning the national Access and Benefit Sharing framework is proclamation on Access to genetic Resources and Community Knowledge and Community Rights (Proclamation No 482/2006 and Regulation 169/2009). Based on these frameworks, the country has been implementing the access and benefit sharing objective of the CBD. The Proclamation includes a range of issues such as ownership, user rights, and conditions for access, benefit sharing, types of benefits, powers and responsibilities among the others.

Therefore, the objective of this information is to encourage any bioprospecting company or an individual interested to work on the genetic resource, *Securidaca longepedunculata*, for medicinal use, production of cosmetics, soap, and fiber.

2. Description of the Plant

Securidaca longepedunculata belongs to the family *Polygalaceae*. It is a medium-sized violet tree indigenous to Ethiopia. It is known by the common names in Amharic: 'Temene', 'Etse-Menahe', 'Etse-Menabele'. The common English names for the plant are: Violet Tree, Rhodes's Violet and Wild Vesteria. It is a semi-deciduous shrub or small tree growing up to a height of 2-6 metres, with a characteristic pale smooth bark with slender branches to an open crown, sometimes with drooping branchlets. Leaves are variable in size and shape, alternate, often in clusters or crowded on dwarf spine-tipped branchlets. Leaves have fine hairs but mature leaves lose the fine hairs. Flowers in short bunches are pink or purple with sweet scent (Junaidu *et al.*,

2014). The bark of young twigs is yellow-green, becoming stringy and pale; rough grey mature bark flakes to show yellow below; deep fissures when old. It is resistant to bush fires and is frost-sensitive (Azene Bekele, 2007).

3. Distribution

Securidaca longepedunculata is found in a wide range of climates, from subtropical, hot and arid climate to summer rainfall and equatorial humid. The violet tree is widely distributed in woodlands and arid savannas of tropical Africa, especially in the Northwest and in the Limpopo provinces of South Africa and Mozambique. It is found widespread in tropical Africa from Eritrea and Ethiopia to South Africa, occurring in semi-arid savannah and deciduous lowland woodland. In Ethiopia, it grows in Dry and Moist Bereha and Kolla agro-climatic zones, common at Benishangul-Gumuz and Gambella. It also occurs in Tigray, Gondar, Gojam, Wollega, Showa, Illubabor and Gamo Gofa in various kinds of woodlands and bushlands. It grows within an altitude of 400 - 1,700 m with mean annual rainfall of 600 -1000 mm (Azene Bekele, 2007).

4. Ethno-medicinal uses

The violet tree, *S. longepedunculata*, known as king of traditional medicinal plants in South Africa, is used for almost every conceivable ailment (Kadiri *et al.*, 2013). The root and bark are taken orally either powdered or as infusion for treating chest complaints, inflammation, abortion, tuberculosis, infertility, heart, kidney, lung, venereal diseases and constipation (Ndou, 2006, cited in Junaidu *et al.*, 2014; Orwa *et al.*, 2009; Dapar *et al.*, 2007). Toothache can also be relieved by chewing the roots. Powdered roots are used to treat headache when rubbed on the forehead. Infusions of the root are used for washing topical ulcers. The powdered root mixed with maize and sorghum beverages are used for sexually weak men. The leaves or roots ground with water and salt is used against snake bites and cough (Sanusi *et al.*, 2014; Orwa *et al.*, 2009; Junaidu *et al.*, 2014).

The plant, called “the mother of all drugs”, in Nigeria, is reputed to have over one hundred medicinal uses (Olajide *et al.*, 1998, cited in Owoyele *et al.*, 2006). In many parts of Africa, the plant is employed in traditional medicine principally for its psychotropic properties; aqueous

extracts of its root are used as psycho-pharmacological agents (Winkelman and Dobkin, 1989, cited in Dapar *et al.*, 2007).

Roots of *S. longepedunculata*, in small doses, are purgative, diuretic, diaphoretic and emetic. They are used for treating conjunctivitis, malaria, venereal diseases, urethral discharges, stomach problems, dysentery, rheumatism, fibrositis, toothache, headache, sleeping sickness, cough, chest complaints, snakebites, and wound dressing, and as an aphrodisiac, taenifuge, vermifuge and expectorant (Sanusi *et al.*, 2014; Dapar *et al.*, 2007; Abuelo, 1999; Junaidu *et al.*, 2014). Seeds are used for treating headache, fever and rheumatism; leaves for treating snakebites, venereal diseases and coughs; bark for treating stomach problems (Orwa *et al.*, 2009).

S. longepedunculata is also used for traditional medicine in the treatment and management of cancer. There are findings suggesting the plant's potential to increase life span in patients with advanced stages of cancer. Herbal supplements could be produced from the plants with low concentration of the extract. Chemotherapeutic applications of the plant also include its potential inclusion in drug development based on the pro-apoptotic potential of the plant (Lawal *et al.*, 2013).

5. Chemical composition of *Securidaca longepedunculata*

In the roots of *S. longepedunculata*, the flavonoids (1, 7-dimethoxy-2-hydroxyxanthone and 1, 4-dihydroxy-7-methoxy-xanthone), the saponins (aglycones presenegin, elymoclavine, sinapic acid, 3, 4, 5-O-caffeoyl-quinic acid, securinine, methylsalicylate) and different monosaccharide sugars such as glucose and fructose were found. The sugars result from hydrolysis of saponins. Some of the xanthenes, which were isolated from the ethyl acetate fraction, showed moderate antimicrobial activity (Owoyele *et al.*, 2006; Smith *et al.*, 1979).

6. Pharmacological activities of *Securidaca longepedunculata*

The phytochemical and antifungal screening of *S. longepedunculata* samples, designate the rich sources of bioactive compounds in potential use of disease management. The presence of various secondary metabolites like tannins, saponins, alkaloids and flavonoids extracted from *S. longepedunculata* might be attributed to its great medicinal importance (Kadiri *et al.*, 2013). *Securidaca longepedunculata* is used as an antifungal agent against infections caused by

Aspergillus niger and *Aspergillus flavus*. The presence of these important chemical substances suggests that *S. longepedunculata* may possess myriads of therapeutic tendencies and ability to manage numerous malaises caused by *Aspergillus* species. The extracts obtained from the plant possess potent antifungal activity (Junaidu *et al.*, 2014; Zulu *et al.*, 2011).

Mouzou *et al.* (1999) studied that the root extract of *S. longepedunculata* can counteract the venom of the snake *Naja nigricollis*. The indigenous healers likewise use this extract against snake bites.

The two xanthenes (flavonoids 1,7-dimethoxy-2-hydroxyxanthone and 1,4-dihydroxy-7-methoxy-xanthone) have a significant relaxation activity on smooth muscle cells. This is similar to the traditional use of the extracts of *S. longepedunculata* for the treatment of men with erectile dysfunctions. Generally, saponins, xanthenes and methylsalicylate can be found as biologically active substances in the extracts of the root and bark of *S. longepedunculata* (Rakuambo *et al.*, 2004; Meli *et al.*, 2007).

7. Importance of other products obtained from *Securidaca longepedunculata*

Food: Young leaves are eaten as a vegetable or in sauces.

Apiculture: It is suitable for honey production as bees often frequent the flowers (Orwa *et al.*, 2009; Azene Bekele, 2007).

Fuel: *S. longepedunculata* can be burnt for firewood and charcoal.

Fiber: Fine quality fiber is obtained from inner bark of the straight, annual shoots, which when retted could possibly be useful for flax-like textiles. It is much appreciated because of its long, durable and tough fibers. It is used for making strings and ropes for fishing net and lines, bird and animal snares, for thread to sew bark cloth and as bead string for necklaces (Orwa *et al.*, 2009; Azene Bekele, 2007).

Timber: The wood, being pale, soft, spongy, very light, and brittle, is used for hut construction and for making poles, bows and brooms. It is resistant to termites and decay.

Lipids: The flowers yield oil with many possible uses; oil expressed from the seeds is used cosmetically or as a furniture stain. Due to the presence of saponins, bark, root bark and crushed

seeds give a soapy solution in water and are used as soap for washing or bleaching cloths (Kadiri *et al.*, 2013).

Ornamental: *S. longepedunculata* is a beautiful flowering tree with potential as an ornamental in parks and gardens (Orwa *et al.*, 2009; Azene Bekele, 2007).

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