



A Review on African Violet Tree (*Securidaca longipedunculata*) : A Traditional Drug with Multiple Medicinal Uses

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Abstract: *Securidaca longipedunculata* Fresen is a plant species with numerous medicinal uses, which is widely distributed in tropical and subtropical areas of Africa. The present work summarizes its traditional uses, toxicity, biological activities, phytochemical constituents and conservation status. The plant was found to be toxic at higher concentrations; particularly the root bark and whole root extracts. The biological activities of the plant include antiinflammatory, antioxidant, antiparasitic, histopathological, antimicrobial, antidiabetic, antiplasmodial, antitrypanosomal, anticonvulsant, enzyme inhibition, insecticidal, molluscicidal and pesticidal activities. Different classes of bioactive compounds which include phenolic acids, xanthenes, glycosides, saponins, steroids, fatty acids, volatile oils, flavonoids, alkaloids and sucrose derivatives were isolated from different parts of *Securidaca longipedunculata*. This important medicinal plant is threatened by over harvesting; this may be due to the fact that the root is the most commonly used part, which makes the plant difficult to survive over harvesting, therefore, there is need by all stakeholders in Africa to initiate conservation program to save the plant. Also, the pharmacology and phytochemistry of the leaves and stem bark of the violet tree should be further investigated.

Keywords: *Securidaca longipedunculata*, traditional uses, toxicity, biological activities, phytochemical constituents, conservation

INTRODUCTION

Securidaca longipedunculata Fresen belongs to the family Polygalaceae, it is a small tree with alternate leaves which are variable in size, shape and crowded towards the stem tips (Van Wyk *et al.*, 2009). Its flowers are small, pink or purple in colour, sweet scented and are usually produced in early summer (Van Wyk *et al.*, 2005). The fruits of this plant are heavily veined, smooth, oblong, purplish green when young and also possess a membranous wing (Coates-Palgrave, 2005).

It is locally known as Uwar magunguna or Sanya (Hausa), Ipeta (Yoruba), Alali (Arabic) and Umfufu (Swahili), while its common names include Violet tree, Fibre tree and Rhodesian violet. The plant is widely distributed in tropical and subtropical areas of Africa, this include Angola, Benin, Botswana, Cameroon, Chad, Eritrea, Ethiopia, Gambia, Ghana, Kenya, Malawi, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Uganda, Zambia etc (Baloyi and Tshisikhawe, 2009; Tshisikhawe *et al.*, 2012).

Although, *S. longipedunculata* is protected under provincial and national legislation in many countries, but it is still one of the most traded medicinal plants in African continent (Moeng, 2010; Tabuti *et al.*, 2012). This important medicinal plant is threatened by over harvesting; this may be due to the fact that the root is the most commonly used part, which makes the plant difficult to survive over harvesting. Other factors include urbanization, expansion of agricultural activities, anthropogenic and environmental conditions such bush fires, droughts etc. (Oni *et al.*, 2014; Abubakar *et al.*, 2018a). The Royal Botanic Gardens also listed the plant in their “adopt a seed, save a species campaign” in order to protect it from becoming endangered and/or extinct (KRBG, 2013).



Plate I: *Securidaca longipedunculata* in its Natural Habitat



Plate II: Leaves and Flowers of *Securidaca longipedunculata*

Traditional Uses of *S. longipedunculata*

The root of this plant is traditionally used to manage fungal infections, fever, malaria, gonorrhoea, headaches, cancer, rheumatism, tuberculosis, diabetes, venereal diseases, syphilis, sexual impotence, toothache, pains, epilepsy, convulsions, constipation, pneumonia, backache, blood purification, sexually transmitted infections, skin infections and also used as an aphrodisiac (Moshi *et al.*, 2007; Viol, 2009; Maroyi, 2013; Mustapha, 2013). Also, leaf of *S. longipedunculata* is locally used to treat epilepsy, headaches, stomach ache, infertility, snakebite, toothache, cancer, skin infections, dislocated jaw, contraceptive purposes and to expel the placenta (Mustapha, 2013), while its stem bark is traditionally used to treat epilepsy, stomach ache, venereal diseases, skin diseases, dysentery, malaria, typhoid, inflammation, chest complaints, abortion, constipation, viral infections, snake bites and infertility problems (Das, 2009; Bruschi *et al.*, 2011; Oladunmoye and Kehinde, 2011; Borokini *et al.*, 2013; Kadiri *et al.*, 2013).

The whole plant is used to wash the mouth and treat infections such as oral candidiasis, excessive coughing and other opportunistic infections associated with Human Immunodeficiency Virus (Chinsemu and Hedimbi, 2010).

The roots or pounded seeds of *S. longipedunculata* can be used as soap and for bleaching items. A fibre obtained from the inner bark can be used like cotton to weave a coarse cloth, fishing nets and baskets. The plant is also used for hut construction, brooms, poles etc (Van Wyk and Gericke, 2000).

Toxicological Studies

The medial lethal dose (LD₅₀) of the ethyl acetate stem bark extract of *S. longipedunculata* was greater than 5, 000 mg/kg body weight, while that of aqueous stem bark extract was found to be above 2, 000 mg/kg body weight (Abubakar *et al.*, 2018b). Also, the acute toxicity studies of the aqueous whole root extract of the plant revealed LD₅₀ values of 1740 mg/kg and 20 mg/kg body weight for oral and intraperitoneal application routes respectively (Adeyemi *et al.*, 2010), while Dapar *et al.* (2007) and (Keshebo *et al.* (2014) reported LD₅₀ values of 37 mg/kg and 547 mg/kg body weight for aqueous and ethanol root extracts respectively. However, death was not recorded when different doses (300, 900 and 2700 mg/kg body weight) of the aqueous root extract were orally administered on a daily basis for 28 days (Etuk *et al.*, 2006).

Biological Activities of *S. longipedunculata*

The leaf and root bark extracts were reported to have antibacterial and antifungal activities (Karou *et al.*, 2012; Musa *et al.*, 2013; Ndamitso *et al.*, 2013). Also, the stem bark extract of this important plant was active against clinical bacterial isolates of *Escherichia coli*, *Salmonella typhi*, *Staphylococcus aureus*, *Shigella dysenteriae*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*; the study supported the use of *S. longipedunculata* stem bark in the management of bacterial diseases and as such could serve as a potential source of antibacterial drugs. (Abubakar *et al.*, 2018c). However, studies reported by other workers revealed that *S. typhi* and *P. aeruginosa* were resistant to the chloroform, methanol and aqueous root extract of *S. longipedunculata*, and this suggests that the stem bark contains more antibacterial agents than the other parts of the violet tree (Gbadamosi, 2012; Ndamitso *et al.*, 2013).

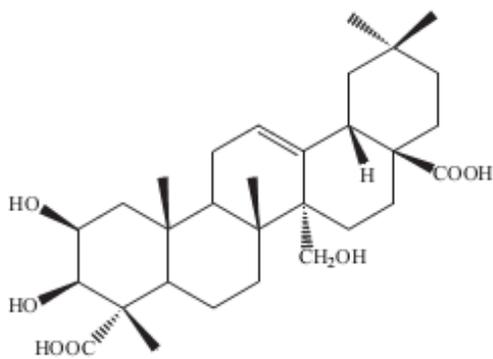
On the other hand, the methanol extract from the root inhibited motility of *Trypanosoma brucei brucei* and *Trypanosoma congolense* (Atawodi *et al.*, 2003), while the petroleum ether extract from the stem bark inhibited motility of *Trypanosoma brucei* (Atawodi, 2005). It was also reported that aqueous and methanol extracts of the root bark showed strong antitrypanosomal activity against *Trypanosoma brucei rhodesiense* (Freiburghaus *et al.*, 1996); larvicidal effect against *Heligmosomoides contortus* and *Heligmosomoides polygyrus* (Adiele *et al.*, 2013). The root bark and leaf extracts were also reported to have antioxidant (Muanda *et al.*, 2010; Karou *et al.*, 2012) and antiplasmodial activities (Bah *et al.*, 2007; Haruna *et al.*, 2013). The methanol root bark extracts showed good antiinflammatory activity (Muanda *et al.*, 2010), while the insecticidal, molluscicidal and pesticidal properties of the root bark, stem bark and leaf extracts were reported by many workers (Boeke *et al.*, 2004; Olofintoye, 2010; Afful *et al.*, 2012; Eziah *et al.*, 2013).

Also, the methanol extract of the root exhibited enzyme inhibition against acetylcholinesterase, carboxylesterase and xanthine oxidase (Bangou *et al.*, 2011). The anticonvulsant, anxiolytic and sedative activities were reported by Adeyemi *et al.* (2010) and Okomolo *et al.* (2011).

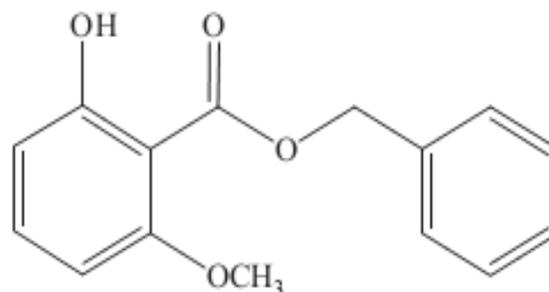
Phytochemical Constituents of *S. longipedunculata*

Preliminary phytochemical screening revealed the presence of alkaloids, cardiac glycosides, flavonoids, saponins, tannins, volatile oils, terpenoids, carbohydrates, phenolic compounds and steroids in different extracts of leaf, root bark and stem bark of the violet tree (Auwal *et al.*, 2012; Gbadamosi, 2012; Abdullahi *et al.*, 2019).

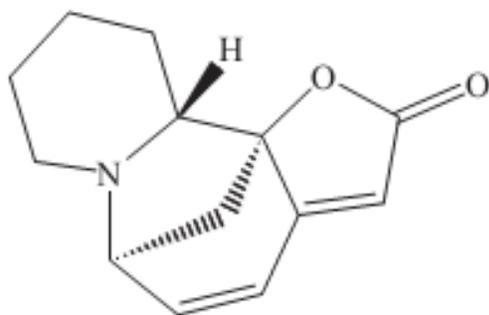
Some of the compounds isolated from the root of the plant include quercetin dehydrate, p-coumaric acid, gallic acid, chlorogenic acid, rutin, cinnamic acid, presenegenin [1], apigenin, quercetin glucosyl, caffeic acid, epicatechic acid, benzyl 2-hydroxy-6-methoxybenzoate [2], 6-hydroxy-2-methoxy benzoic acid, 1,6,8-trihydroxy-2,3,4,5-tetramethoxyxanthone, 1,6-dihydroxy-2,3,4,5,8-pentamethoxyxanthone, 8-hydroxy-1,4,5,6-tetramethoxy-2,3-methylene-dioxyxanthone-4,6,8-trihydroxy, 1,2,3,5-tetramethoxyxanthone and Muchimangins A, B, C and D, which are highly oxygenated xanthones (Muanda *et al.*, 2010; Dibwe *et al.*, 2012). Securinine [3], β -Sitosterol [4], Quercetin-3-O-D-xyloside, 1, 7-dihydroxy-4-methoxyxanthone [5], methyl salicylate, 1,6,8-trihydroxy-2,3,4,7-tetra-methoxyxanthone [6] and 5-O-prenyl-1-hydroxy-3, 4, 6, 7, 8-pentamethoxyxanthone [7] were also isolated from the leaves and root of this important medicinal plant (Debella *et al.*, 2000; Lognay *et al.*, 2000; Jayasakara *et al.*, 2002; Van Wyk *et al.*, 2005; Meli *et al.*, 2007). Similarly, 3-O- β -D-glucopyranosylpresenegenin-28-O- β -apiofuranosyl-(1-3)- β -D-xylopyranosyl-(1-4)-[β -D-apiofuranosyl-(1-3)]- α -L-rhamnopyranosyl-(1-2)-{4-O-[(E)-3,4,5-trimethoxy cinnamoyl]}- β -D-fucopyranose and other related compounds were isolated from the methanol root extract of *S. longipedunculata* (Mitaine-Offer *et al.*, 2010).



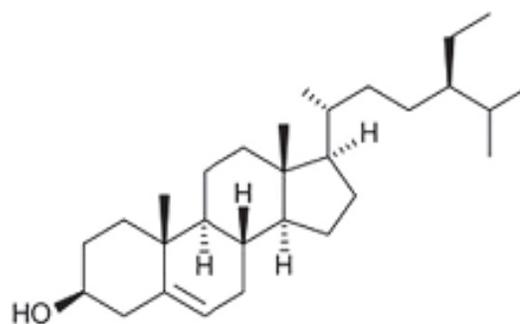
[1]



[2]



[3]



[4]

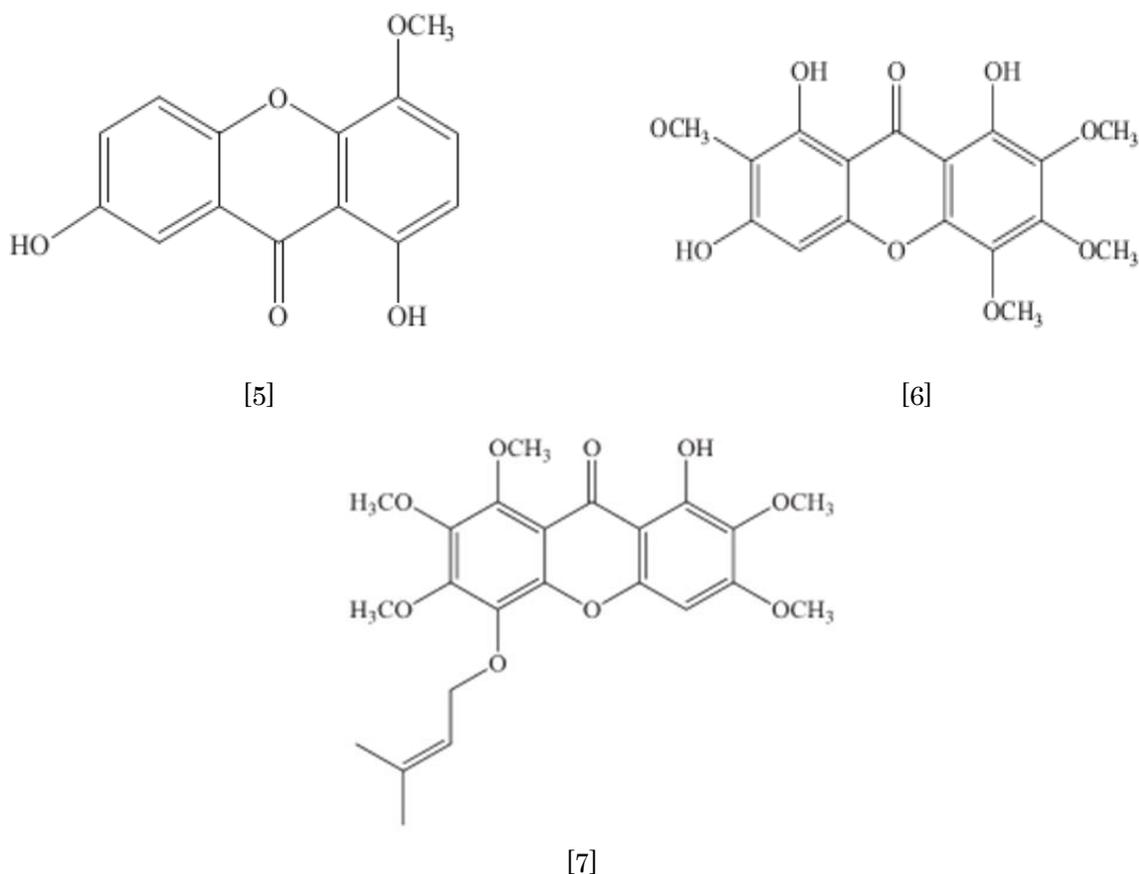


Figure 1: Chemical Structures of some Compounds Isolated from *S. longipedunculata*

Conclusion

The present work has emphasized that *S. longipedunculata* is one of the most important medicinal plants in African traditional medicine. Biological studies have supported the traditional uses of this plant; therefore, it could serve as a potential source of many drugs of plant origin. There is need by all stakeholders in Africa to initiate conservation program to save this plant from becoming endangered and/or extinct. Finally, the pharmacology and phytochemistry of the leaves and stem bark of the plant should be further investigated.

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