

**Bioprospecting potential of *Justicia schimperiana*
for Access and Benefit Sharing**



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Table of Contents

1. Introduction.....	2
2. Description of the Plant.....	2
3. Distribution	3
4. Propagation	3
5. Ethno-pharmacological use.....	3
6. Chemical composition and Pharmacological Activities	4
6.1. Hypoglycemic and antihyperglycemic activities	4
6.2. Hepatoprotective activities.....	5
6.3. Anti-malarial activity	5
7. References.....	6

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 monetary resources to explore this rich biodiversity and traditional knowledge significantly. The only option for Ethiopia is to collaborate with developed nations or domestic investors and interested ones in the pharmaceutical, cosmetics and other companies so as to jointly explore them strategically and wisely.

The Ethiopian Biodiversity Institute (EBI) is the nationwide capable authority which plays a practical role of the Nagoya Protocol on Access and Benefit sharing of genetic resources and associated traditional knowledge. The laws concerning the National Access and Benefit Sharing framework are a Proclamation on Access to Genetic Resources and Community Knowledge and Community Rights (Proclamation No. 482/2006) and Regulation No. 169/2009). Based on these frameworks, the country has been implementing the access and benefit sharing objective of the Convention on Biological Diversity (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 resources, *Justicia schimperiana*, for medicinal uses such as scabies, fever, asthma, excessive pellagra, constipation, malaria, gonorrhoea, rabies, headache, ascariasis, hemorrhage, Hepatitis B, diarrhoea, dysentery, Stomach-ache, burning, bilirubinemia, diabetes mellitus and use as industrial potential .

2. Description of the Plant

Justicia schimperiana (Hochst. ex Nees) T. Anders. (Syn: *Adhatoda schimperiana*; *Gendarussa schimperiana*). It belongs to the family of Acanthaceae. It is known by the common names in Amharic: Sensel, Simiza, Sansal and Dumoga. *Justicia schimperiana* is an erect leafy shrub which grows up to 4-5 m high usually much branched from base (with stems 2-3 m high). Its stem is brittle i.e. it breaks easily. Its leaf is simple and opposite, long oval to 13 x 4 cm, tip pointed, narrowed to a short stalk. Its flower is inconspicuous terminal heads on long stalks seen clearly above the leaves, each small flower lies inside a green-yellow leafy bract 1.5 cm long, its

edge clear and membranous, flowers white or yellow white, tubular to 3 cm long, two-lipped with dark purple throat or lines on the lip. The plant has slightly unpleasant smell (Ermias Dagne, 2009; Azene Bekele, 2007).

3. Distribution

Justicia schimperiana is a common shrub growing in moist montane forest, usually near streams and rivers, in evergreen scrub on hill slopes, forest clearings, coffee plantations, waste ground or planted as hedges around homesteads in Dry and Moist ‘Weyna Dega’ and Moist ‘Dega’ agro-climatic zones in Tigray, Gondar, Gojjam, Ilubabor, Keffa, Sidamo, Shoa and Harerghe, 1, 300–2, 800 m (Azene Bekele, 2007).

4. Propagation

Justicia schimperiana is usually propagated by cuttings, and seedlings can also be raised from it.

5. Ethno-pharmacological use

The Acanthaceae family is an important source of therapeutic drugs, and the ethno-pharmacological information of this family needs urgent documentation and further investigation. *Justicia schimperiana* is the largest genus of Acanthaceae, with approximately 600 species (Corrêa and Alcântara, 2012). Several species of *Justicia* are widely used in folk medicine for the treatment of respiratory and gastrointestinal diseases as well as inflammation including applications in rheumatism and arthritis. The plants are also utilized for their effects on the central nervous system as hallucinogens, somniferous agents, sedatives, depressors, and treatments for epilepsy and other mental disorders (Corrêa and Alcântara, 2012).

In Ethiopia, *Justicia schimperiana* is used in the treatment of various ailments such as scabies, fever, asthma and other inflammatory situations, excessive pellagra and constipation (Yinebeb Tariku, 2008), malaria (Yinebeb Tariku, 2008; Gidey Yirga and Zerabruk, 2012), gonorrhoea, rabies, headache (Endalew Amenu, 2007; Gidey Yirga and Zerabruk, 2012; Balcha Abera, 2014; Tolera Fufa *et al.*, 2017). It is also used to treat ascaris by people in Zegie Peninsula, Northwestern Ethiopia (Tilahun Teklehaymanot and Mirutse Giday, 2007), for hemorrhage and Hepatitis B treatment by people in Bale, Southeastern Ethiopia (Haile Yineger *et al.*, 2008), diarrhoea, dysentery, stomach-ache and burning (Tilahun Teklehaymanot, 2009) and for

Bilirubinemia (Moravec *et al.*, 2014). Andualem Tesfaye *et al.* (2016) reported that *Justicia Schimperiana* has been also traditionally used for the treatment of *Diabetes mellitus*.

Leaves of *Justicia schimperiana* are used to treat headache and its root is used for treatment of liver disease (Moa Megersa, 2010). Endalew Amenu (2007) also reported that the plant is used in treatment of livestock ailment (blackleg) and internal parasite. In addition, Reta Regassa (2013) also reported that *Justicia schimperiana* is used to treat malaria and gonorrhoea in southern Ethiopia. The result of the recent study by Tadesse Birhanu and Dereje Abera (2015) also indicated that the leaf and root of *Justicia schimperiana* is used in the treatment of rabies and coccidiosis at Horro Guduru district, western Ethiopia. Moreover, Mirutse Giday *et al.* (2006) also reported that *Justicia schimperiana* is used to treat skin lesion in Shinasha, Agew-awi and Amhara peoples in northwest Ethiopia. Furthermore, its fresh root is used to treat diseases in emergency; its leaf and shoot are used to treat malaria and its leaf is used in the treatment of coccidiosis (Getaneh Gebeyehu, 2011). Abiyu Enyew *et al.* (2014) also reported that fresh leaf of *Justicia schimperiana* is used to treat rabies in Fiche District, Central Ethiopia.

In eastern Ethiopia, the plant is also used as a laxative. In northern, western and central Ethiopia, the plant alone or in combination with other plants, is used for epilepsy, mental illness, eye diseases, jaundice, leprosy, syphilis, measles, relapsing fever, vitiligo, gout, hookworm, *Tinea corporis* 'Robi', acute febrile illness, venereal diseases, leishmaniasis, urine retention, lice infestation and cough. Insect repellent, hypotensive, histamine antagonist, cardiac depressant, oxytocic and abortifacient effect of the plant also have been recorded. It has also been reported that different parts of the plant are used as expectorant, anthelmintic and antispasmodic (Eyasu Mekonnen, 2005 cited in Jemal Abdela, 2014; Etana Tolassa, 2007; Nigussie Amsalu, 2010; Mengistu Gebrehiwot, 2010).

6. Chemical composition and Pharmacological Activities

6.1. Hypoglycemic and antihyperglycemic activities

Justicia Schimperiana has been traditionally used for the treatment of *Diabetes mellitus*. Andualem Tesfaye *et al.* (2016) evaluated the hypoglycemic and antihyperglycemic activities of aqueous extract of *Justicia schimperiana* leaves in normal and streptozotocin-induced diabetic

mice. The result indicated that aqueous extract of *Justicia schimperiana* has significant antihyperglycemic activity in streptozotocin induced diabetic mice and improvement in glucose tolerance as well as slight hypoglycemic activity in normal mice and justifying the traditional claim for its use in diabetes. In addition, *Justicia schimperiana* contains alkaloids, phenols and terpenoids (Eyasu Mekonnen *et al.*, 2006 cited in Andualem Tesfaye *et al.*, 2016). Any of these secondary metabolites may be responsible for the glucose suppression in the blood.

6.2. Hepatoprotective activities

The experimental study of Shemsu Umer *et al.* (2010) indicated that *Justicia Schimperiana* has hepatoprotective activity (the ability to prevent liver damage) due to the presence of hydroalcoholic in the leaf extracts. As the hydroethanolic extracts offered higher antioxidant activity, it is possible to establish the potential application of hydroalcoholic extracts from *Justicia schimperiana* in development of products with antioxidant properties and demonstrate a promising pharmaceutical product.

The methanol extracts of *Justicia schimperiana* also possess antioxidant activities. Shemsu Umer *et al.* (2010) also reported that the hepatoprotection of *Justicia schimperiana* against CCl₄-induced hepatotoxicity in mice, which could be attributed to the free radical scavenging activity of its extracts. This justifies the traditional uses of *Justicia schimperiana* in Ethiopia for the treatment of some hepatic disorders and suggests the possible utilization of these plants as a source of new drugs.

6.3. Anti-malarial activity

Justicia schimperiana is traditionally used for the treatment of malaria and the crude extract confirmed of the plant is endowed with antimalarial activity. Moreover, Jemal Abdela (2014) evaluated the antimalarial activities of chloroform, methanol and aqueous fractions of the leaves of *Justicia schimperiana* against *Plasmodium berghei* in mice.

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