

Review on Phytochemistry and Pharmacological Aspects of *Guiera Senegalensis* J. F. Gmel (Combretaceae)

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Abstract— Medicinal plants are the local heritage with global importance. They have curative properties due to presence of various complex chemical substances of different composition, which are found as secondary plant metabolites in one or more parts of these plants. These plant metabolites according to their composition are grouped as flavonoids, tannins, alkaloids, saponins etc...*Guiera senegalensis* J. F. Gmel. (Combretaceae) is one of the most important West African medicinal plants, often used to treat a variety of microbial infections.

Index Terms— Phytochemistry, Pharmacological Aspects, *Guiera Senegalensis*.

I. INTRODUCTION

Guiera senegalensis is called Sabara” (Hausa), [1]. It is a shrubby and can grow to a height of 3 to 5 m depending on the habitat [2]. The leaves which are 3 to 5 cm long and 1.5 to 3.0 cm broad are arranged opposite or sub opposite on the stem [3]. It is widely distributed in the savannah region of west and central Africa, Nigeria, Senegal, Gambia, Mali, Niger, Burkina Faso and Ghana, [4- 6]. It is active against cough, respiratory congestion and fever [7,8], and is prescribed as an antitussive, hypertension and hypotension as well as venereal diseases [7], to ease breathing and to treat lung and bronchial disorders. It is also used against malaria fever [9].

II. BOTANICAL DESCRIPTION

A. Scientific Classification

Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Myrtales
Family: Combretaceae
Genus: *Guiera*
Species: *senegalensis*

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B. Local names [10]

Bamanan : N’Kunje
Bomou : Suncawe, Sunlayi
Dogon : Guru, Tulu
Hausa : Sabara
Kasonké : Kangano
Peulh : N’Geloki
Senoufo : Konifire, Kogbwe
Sonrai : Sabara
Wolof : N’Ger
Tamacheck : Subara

C. Vernacular name: Nuger

D. Morphology

Guiera senegalensis, very well known in its native area, generally occurs as a shrub that can grow to a height of 3 to 5 m according to habitat. Its stem presents numerous knots that send out branches. The ash-grey stem and branches have fibrous or pubescent bark and bear opposing, short petiolated oval leaves, sometimes mucronate, sometimes even cordate at their base, about 2 to 4 cm long by 1 to 2 cm wide. These grey-green leaves, darker on their upper surface, display black spots on their lower surface and are slightly downy on both sides. These features lend the plant an overall silver green colour that is conspicuous in brushland [2]. Flowering occurs almost throughout the year, when it is leafy. Often blooms twice a year, during the dry season and the rainy season. Each flower has a calycal tube ovoid, welded to the ovary. This tube is topped by a bellflower blade with 5 teeth screened black and persistent points to fruiting (Figure 1). The liguliform corolla is composed of 5 petals also riddled with black spots. The stamens are 10 on two rows of 5, all inserted on the calyx. The ovary has a single box containing 4 to 6 eggs [11].

The fruit is an achene (Figure 1) around 3 cm long brown or green ash, spindle-shaped, hairy with sides and the remains of the calyx [11].



Fig 1: Flowery and fruity branches of *Guiera senegalensis* J.F. Gmel (Combretaceae) by Mamadou Koumaré

III. HABITAT AND REPARTITION

It is a plant that grows primarily in Sudanian Sahel area, on soils sandy, leached or exhausted, fallow and dry stations. Plant pioneer disseminated by cattle in the fallow land, it is also indicative of overgrazing. It is found from Senegal to Cameroon to Sudan. Widespread and common, locally gregarious and very abundant [12].

IV. PHYTOCHEMISTRY

Earlier works showed that leaves and roots of *G. senegalensis* contained harman, tetrahydroharman, harmalan and Guieranone A [1]. The plant has been found to contain carbohydrates, steroids, flavonoids, saponins, alkaloids, tannins and mucilage [24, 26]. Ficarra et al. in 1997 found four flavonoids in the leaves of *G. senegalensis*, namely catechin, myricitrin, rutin and quercetin [13]. Some findings on the plant elsewhere showed the presence of alkaloids (Hyoscyamin [I] and solanine, [II]), tannins, terpenoids menthol, coumarins, saponins, flavonoids (quercetin,[III]), cardiotonics and cyanogenic heterosides which were assayed in various organs of the plant leaves, stem bark, fruits and roots [12]. Hyoscyamin [I], solanine [II] and quercetin [III] are represented in figure 2. While in the gall of the plant from Ouagadougou, Burkina Faso, alkaloids, polyphenols and saponins were detected [23]. The ashes are poor in alkali but rich in alkaline earth metals. We found especially Mg, Ca, Sr, Ti, Fe, Al and in lesser amounts sometimes traces: Cu, Ni, Co, Zn [11]. Previous studies indicated the presence in leaves of two alkaloids (harman, tetrahydroharman or eleagnine), flavonoids, naph-thopyrans, tannins, and a naphthyl butenone (guieranone A); in roots, were only obtained tannins and the same beta-carboline alkaloids than in leaves [9, 11, 29, 30, 31, 32, 33, 34].

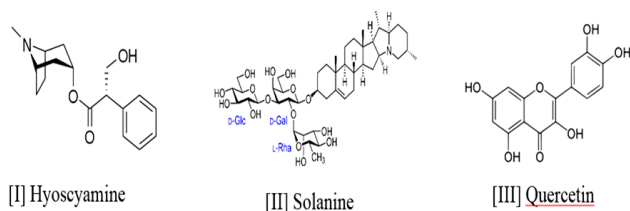


Fig 2:Chemical structure from *Guiera senegalensis* [12].

V. TRADITIONAL USES

G. senegalensis is considered by traditional practitioners of Burkina Faso, Senegal, and Mali as a panacea, both its medicinal properties are significant and varied.

The usual form of preparation for internal use is in decoction or mixed with food preparations. *G. senegalensis* leaves are widely administered for pulmonary and respiratory complaints, for coughs, as a febrifuge, colic and diarrhea, syphilis, beriberi, leprosy, impotence, rheumatism, diuresis and expurgation [3,4].

VI. PARMACOLOGICAL AND TOXICOLOGICAL ACTIVITIES

Guiera senegalensis is a popular medicinal plant for both human and veterinary use in West Africa. Its leaves have been

reportedly used to treat rhinitis, bronchitis and fever, and the roots to treat diarrhea and dysentery. It is recognized as being active against cough, respiratory congestion and fever [14], and is prescribed as an antitussive [11,15,16,17,18], to ease breathing and to treat lung and bronchial disorders. It is also used against malaria [9,19,20]. The syrup D2 from *G. senegalensis* has been screened for its antitussive clinical essay [10]. Aqueous extracts from its roots and leaves have also been screened for toxicity [21]. The galls of *G. senegalensis* are used in Burkina Faso as an ethnoveterinary product to increase milk production in cows and to treat fowlpox infection in chickens [22].

Guiera senegalensis leaves extract or fractions may be used for the treatment of various disease caused by *Escherichia coli*, *Pseudomonas aeruginosa* and *Klebsiella pneumonia* [24].

View toxicity aqueous extracts are overall low toxicity; "extract of leaves being slightly more active than the extract from roots in the Guinea pig, rabbit, dog and less active in mice and rats [11]. *G. Senegalensis* at lower doses is not harmful to the liver and therefore can be exploited as it is served in the treatments of some illnesses [25]. Treatment with water and methanol extracts from *G. senegalensis* leaves resulted in endotheliotoxicity, hepatonephropathy and pancreatic hyperplasia [27]. Guieranone A from *Guiera senegalensis* showed a strong antiplasmodial activity associated with a high cytotoxicity toward human monocytes [1]. Methanol fraction from leaves extract only had antiplasmodial activity [28].

VII. CONCLUSION

Herbal drug which are used in various traditional medicine, needs detailed investigation with ethno-pharmacological approach. In the present review we have made to explorer the all details of *Guiera senegalensis* information its botany, habitat, ethnoveterinary, traditional and modern uses.

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