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Ethnomedicinal and economical profile of *Triumfetta cordifolia*: A mini-review

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Abstract

Triumfetta cordifolia is a fast-growing, sparsely branched shrub that is erect with hairy but sometimes smooth stem commonly found in Florida, Bermuda, Central, and South America as well as in West Africa. In Nigeria, it is mainly found in the Southern region. It is widely spread in moist areas of tropical Africa and is found wild or cultivated. It belongs to the family Tiliaceae. The plant mainly contains alkaloids, steroids, cardiac glycosides, saponins, terpenes, tannins and flavonoids which exhibit various important biological activities such anti-diarrhoeal, antiulcerogenic, antidiabetic, antibacterial, antimalarial, antifungal and anti-inflammatory properties. All parts of the plant; roots, stems and leaves are pharmacologically useful. The *Triumfetta cordifolia* plant is used in African traditional medicine for the treatment of muscle pain, asthenia, dysentery, hepatitis, liver and kidney ailments among others. This paper presents a review on botanical description, ethnomedicinal uses, phytochemistry and economic impact of *Triumfetta cordifolia* as a medicinal plant.

Keywords: *Triumfetta cordifolia*, medicinal plant, ethnomedicine, phytochemical constituents

Introduction

Over the centuries humans have been dependent on plants for their fundamental needs such as food, shelter, and clothing. In the environment we live in, plants serve as sources of nutrition and medicinal herbs for man and other animals. Among plants of economic importance are the medicinal plants. According to the World Health Organization ^[1], a medicinal plant is any plant which, in one or more of its organs, contains a substance that can be used for therapeutic purposes, or which are precursors for chemo-pharmaceutical semi synthesis ^[2]. The medical value of these plants lies in some chemical substances called phytochemicals that produce a definite physiological action in the human body. Phytochemicals are naturally occurring bioactive compounds in the leaves, stems, barks, fruits and roots of medicinal plants which take part in the defense mechanisms that protect the plants, animals and humans that feed on them from various diseases ^[3]. The most important of these bioactive constituents in plants are alkaloids, tannins, flavonoids and phenolic compounds ^[4, 5].

Plants are the richest resource of drugs of the traditional systems of medicine, modern medicines, food supplements, folk medicines, pharmaceutical intermediates and chemical entities for synthetic drugs. All over the world, plants have served as the richest source of raw materials for traditional as well as modern medicine, particularly in Africa and Asia ^[6]. Through trial and error, it was discovered that some plants are good for food and that some are poisonous, and some produce bodily changes such as increased perspiration, bowel movement, urination, relief of pain, hallucination, healing etc. ^[7]. In many African traditions, these observations have been passed down from generation to generation orally, with each generation adding and refining the body of knowledge. Medicinal plants are used locally in the treatment of infections caused by bacteria, fungi, viruses and parasites. Over 60% of people in Nigerian rural areas depend on the traditional medicines for the treatment of their ailments ^[8]. In Nigeria, traditional plants play an important role in the medical system and plants remain an important resource to combat serious diseases worldwide ^[9].

There are a large number of medicinal plants whose scientific importance has not been explored. Data has revealed that out of about 250,000 flowering plants in the world more than 50,000 are used for medicinal purposes ^[10]. Medicinal plants are becoming increasingly popular in the society as natural alternatives to synthetic chemicals ^[11]. In the last few decades the use of herbal medicine has increased exponentially owing to their efficacy with very little or no side effects, as well as their low cost.

According to WHO ^[1], the use of medicinal herbs, has become widely popular even in the industrialized countries as a complementary way to cure and prevent diseases. It is also known that about 80% of the world's population does not have access to conventional drugs ^[12]. In many African countries the rate is much higher.

The study of medicinal plants has attracted many researchers, owing to the useful applications of plants for the treatment of various diseases in humans and animals. Medicinal plants can be used to treat ailments such as hypertension, ulcers, diabetes, measles, fever, diarrhea and many more others ^[13].

Taxonomic Classification of *Triumfetta cordifolia*

#	Classification	Nomenclature	Common/local Name
1	Kingdom	Plantae	-
2	Division	Tracheophyta	-
3	Order	Malvales	-
4	Class	Magnoliopsida	-
5	Family	Tiliaceae	akeri, Bide pali
6	Genus	Triumfetta	-
7	Species	Cordifolia	-

Botanical description and distribution

Triumfetta cordifolia belongs to the family Tiliaceae,



Fig 1: Leaves of *Triumfetta cordifolia*



Fig 2: Flowers and Leaves of *Triumfetta cordifolia*



Fig 3: Stem and fruits of *Triumfetta cordifolia*

Growth Requirement and propagation

Triumfetta cordifolia is a fast growing plant that is widely spread in moister areas in the tropics. It can be successfully grown in sandy and clay soils with pH values between 5.5 and 8.0 ^[17]. The flowering normally starts in February-May and the fruiting in March-June. It prefers a position with some shade and it also partly appears as weed in cultivated crops ^[18]. The plant is most times dispersed by humans and animals because the seed capsules are covered in hooked bristles that stick to clothing and the fur of animals and thereby dispersed widely. *Triumfetta cordifolia* can be propagated by seed. A germination rate of 80-90% is normal. Cuttings from leafy stems can also be used for propagation. Since the plant does

variously known as akeri (local name), cordleaf burbark and Burweed (English), and bide pali (izon). The plant *Triumfetta cordifolia* is commonly found in Florida, Bermuda, central and South America as well as in West Africa. But it is widely spread in most areas of tropical Africa. In Nigeria it is mainly found in the Southern region like Akwa Ibom state, Bayelsa state etc. ^[14]. *Triumfetta cordifolia* occurs from sea level up to 2650m altitude. This plant is very common in riverine forest, marshy locations, secondary forest, wooded grassland, edges and clearings of wet forest, roadsides and disturbed land ^[15, 16].

It is a tropical shrub, usually growing up to 2.5m in height but exceptionally to 5m. The leaves of this plant are simple, alternate, stipules triangular, 4-17mm long, densely stellate hairy with petiole terete up to 13.5cm long. The flowers are small, regular and bisexual; pedicel is up to 3mm long; it has five sepals; free and narrowly oblanceolate, up to 11mm long, with an extremely short apical spine, outer surface densely brownish-grey stellate hairy to almost glabrous. The fruit is a dehiscent that is almost spherical capsule 7-15mm in diameter (including bristles). The fruit is dark brown, glossy and glabrous or with sparse simple hairs (rarely dense). The stems are about 15mm in diameter at the base ^[14].

not perform well under direct sunlight, the cuttings are usually planted in the shade of a tree. They are planted in a circle with a spacing of 10-15cm ^[14].

Ethnomedicinal Uses

Triumfetta cordifolia is a widely used plant in African traditional medicine as its various parts are employed to treat several diseases. It is used across Africa for various ailments such as hepatitis, asthenia, muscle pain, diarrhea, etc. The sap of leafy twigs of *Triumfetta cordifolia* is widely used in ethno medicine for the treatment of digestive disorders, dysentery, diarrhoeal, diabetes, asthenia, ulcerogenic conditions, hepatitis, muscle pain, rhinitis, inflammation, fever, backache

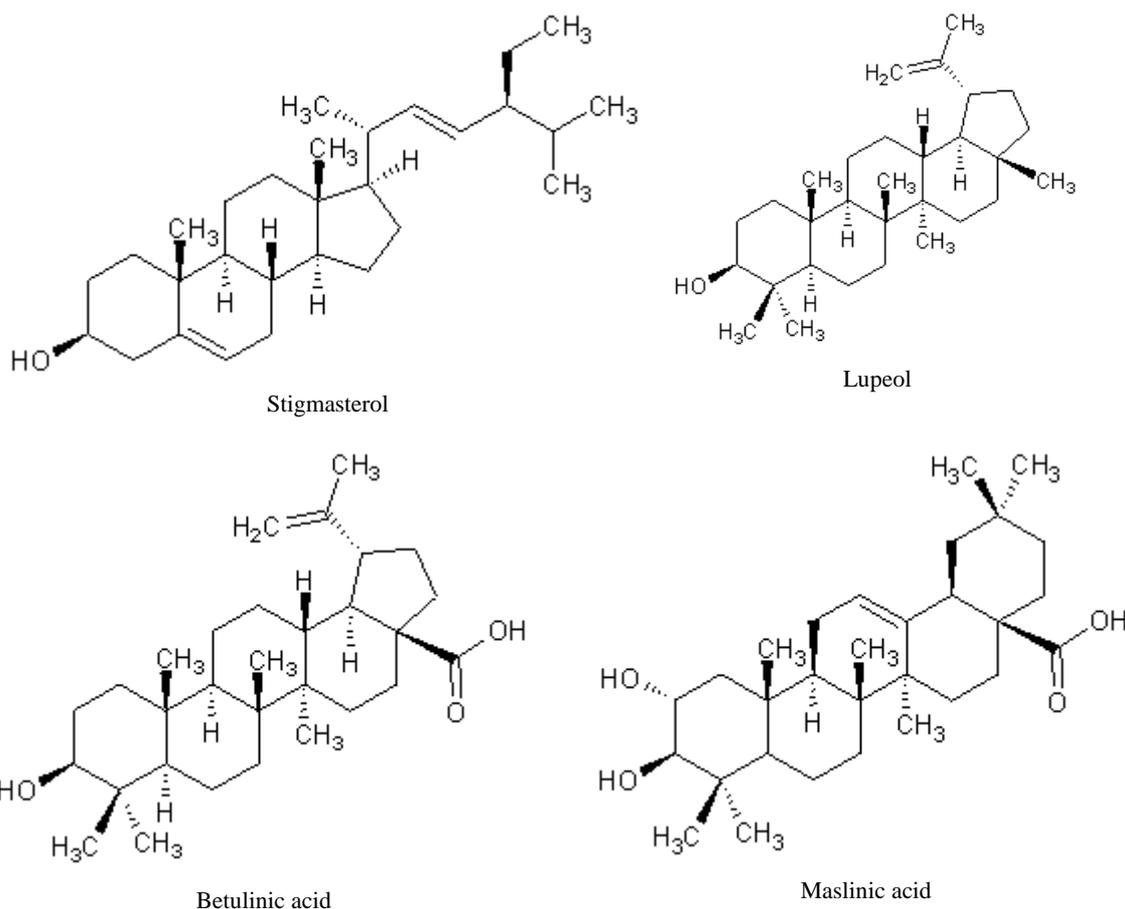
and mental disorders [19]. A decoction of the twigs with sugar is taken for the treatment of dyspnoea and intercostals neuralgia. Palm wine in which the pounded bark of *T. cordifolia* has been steeped is drunk for the treatment of lung problems. The leaves of *T. cordifolia* are used in the treatment of benorrhoea [20]. The root of *T. cordifolia* is used for the treatment of venereal diseases, liver and kidney disorders; while the fruit can also be macerated in water or local alcohol for the treatment of delayed labour [19]. The sap of the root or leaf, diluted with water, is taken to ease childbirth, to expel the placenta, and for the treatment of sterility in women. The stem of *T. cordifolia* is used to induce weight loss and is said to have anti-hyperlipemic [14]. The decoction of the flowers is used for the treatment of malaria and also grounded flowers are steeped in water which is taken against nausea. The fruits of *T. cordifolia* are also used to treat gastrointestinal disorders, diarrhoea and ulcers [17]. In case of insanity or possession, the sap of leafy twigs is drunk and the body is sprinkled with it. The leaves of *T. cordifolia* are also used as psychotropic [21].

Phytochemistry

The pharmacological benefits of medicinally important plants are primarily due to bioactive phytochemicals produced in the

plant tissues as primary and secondary metabolites. Most of the biological effects ascribed to *T. cordifolia* extracts have been attributed to its primary bioactive constituents, derived from its leaves, fruits and roots [19]. Preliminary phytochemical investigation of different parts of plant extracts of *T. cordifolia* showed the presence of alkaloids, saponins, tannins, steroids, terpenes, cardiac glycosides, and flavonoids like quercetin [21], betulinic acid, maslinic acid, stigmasterol, tormentic acid, heptadecanoic acid, oleanolic acid, lupeol [19, 22, 23] and all have been reported to demonstrate diverse biological activities. The leaves are found to contain various chemical constituents including heptadecanoic acid, β -carotene, oleanolic acid, and 24-hydroxytormentic acid. The stems are found to contain various chemical constituents including lupeol, stigmasterol, 3-O- β -D-glucopyranoside of β -sitosterol, and tormentic acid [23].

Accordingly previous studies have shown that *T. cordifolia* possess antidiabetic, antibacterial, antifungal, antidiarrhoeal, antiulcerogenic, antimicrobial, analgesic, cytotoxic and anti-inflammatory properties [17, 21, 23, 24]. In addition, maslinic acid and its oxidized derivative, betulinic acid are known to have anti-HIV activity [19, 25]. Preclinical studies have also shown that *T. cordifolia* demonstrated strong antioxidant activity, as it was shown to be efficient in scavenging free radicals [22].



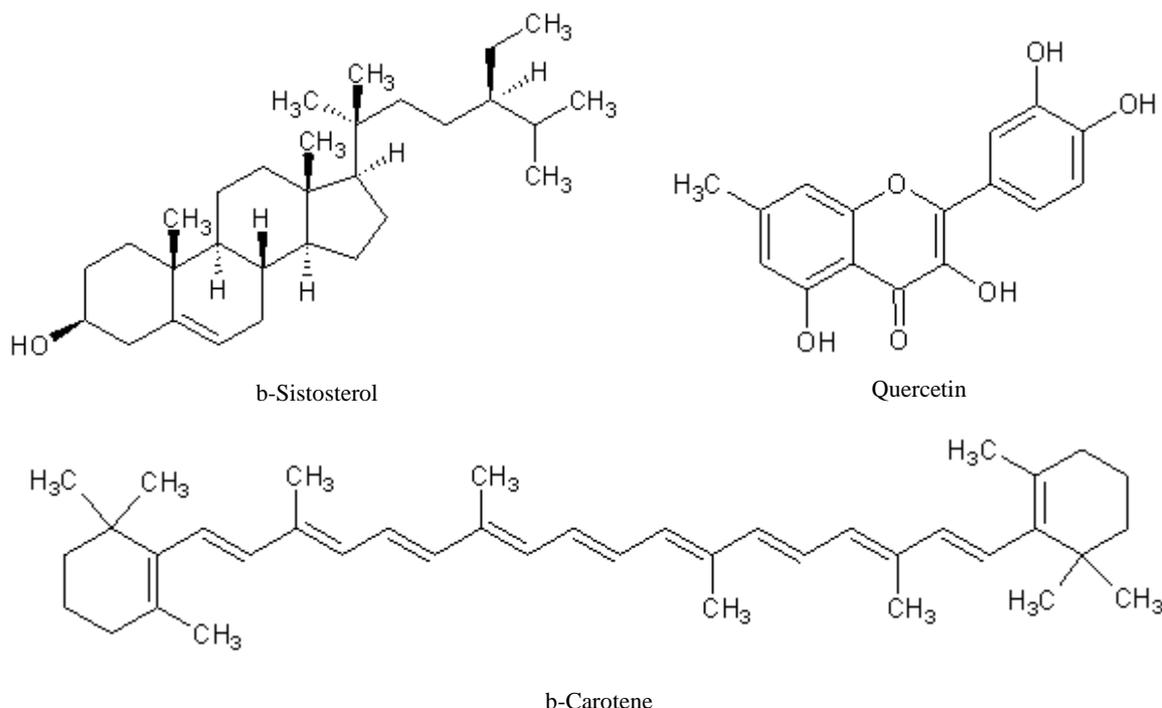


Fig 4: Structures of some chemical constituents isolated from *Triumfetta cordifolia*

Economic Considerations

Triumfetta cordifolia is used locally. In the Democratic Republic of the Congo it has sometimes been an important item of commerce^[14]. *T. cordifolia* is known to produce strong bast fibers, which also have an industrial history. The bark of the stem and branches yields a fiber, which in the form of bark ribbons or after retting is locally used for making strong ropes, bowstring and fishing lines^[26]. The fiber has been used for making burlap cloth, sacks and packaging material. In the 1950s, Belgium imported large amounts of these fibers from the Democratic Republic of the Congo and used them to produce coffee bags^[14]. However, the fibers are rarely used today. In the Democratic Republic of the Congo the wood is used for house construction and as a fire wood. The plant is said to be resistant to fire and so it has the potential to be used in fire-breaks, while the twigs serve locally as chewing sticks^[14]. In the Uige province in Northern Angola, people still use *T. cordifolia* traditionally to produce bags, textiles, mats, baskets and other products^[26, 27]. It is sometimes made into belts used for climbing trees and palms, for instance to collect palm fruits for making palm wine. Ash from the burnt leaf of *T. cordifolia* is used in making soap and in the indigo industry in Guinea^[14]. The plant parts are locally used as toothbrushes. The leaf is commonly eaten as a cooked vegetable^[14]. The bark of green shoots is a source of mucilage, which is used for making soups and sauces with a sticky consistency. The mucilage is often used as baby food and for young children not yet able to eat coarse starchy foods. Because of its high energy value, the soup is often the first dish given to women who have delivered a child. It is also used as appetizer^[14]. In the Western province of Cameroon, the aqueous extract from the stem of *T. cordifolia*, which is a gum, is consumed as a stew^[28].

Conclusion

From the current review we can conclude that *Triumfetta cordifolia* plants have a very versatile lifestyle and can be considered as a potential source of useful drugs. Structurally diverse compounds isolated and identified from *T. cordifolia* plant have demonstrated biological activities. *T. cordifolia*

plant extracts exhibit pharmacological activity, including, anti-diarrhoeal, antiulcerogenic, antidiabetic, antibacterial, antimalarial, antifungal, antimicrobial, analgesic, anti-hyperlipemic, cytotoxic, anti-inflammatory properties etc. These extract of *T. cordifolia* are also used for the treatment of dysentery, hepatitis, diarrhea, ulcer etc.

It is hoped that the detailed information provided in this review on the plants medicinal uses, phytochemical, biological and economic properties would serve as a useful tool for proper evaluation of the plant in medicine which may lead to drug discovery. And also further investigations of the chemical constituents of *T. cordifolia* are necessary to fully understand the molecular mechanisms of their action and to ensure that the plant extracts are safe for human use.

Conflict of Interest: None declared.

Contribution of Authors

IT Ajoko: Writing - original draft; **BMW Amos-Tautua:** Conceptualization & supervision; **SP Songca:** Writing - review & editing

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