A MINI-REVIEW ON Musanga cecropioides R. Br. ex Tedlie

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ABSTRACT
Musanga cecropioides R. Br. ex Tedlie (family Urticaceae) is a tree distributed across some parts of Africa including Nigeria. Ethnomedicinal surveys of Musanga cecropioides implicate that its various parts are used in the management of several health conditions aside the numerous uses reported ethnobotanically. This review was thus aimed at assessing the extent of work done on Musanga cecropioides parts scientifically in order to identify the gaps that exist in literature. The review revealed the widespread application of Musanga cecropioides parts in the management of cough, diabetes and several other illnesses with little or no scientific work carried out to validate such claims.

KEYWORDS: Musanga cecropioides, ethnobotany, ethnomedicine, characteristics and properties.

INTRODUCTION
Traditionally, the use of plants to treat and manage illnesses, diseases, wounds and general wellness dates as far as man began to dominate the earth as over 90% of traditional medicine recipes and remedies have been known to contain medicinal plants (Sofowora et al., 2013). In Africa, over 80% of the population depends on the use of medicinal plants in meeting their health care needs (Mahomoodally, 2013). This practice has evolved over the years with knowledge acquired from the use of plants, passed on from generation to generation, with some of this knowledge being lost (Oyeyemi et al., 2019). Man’s reliance on plants for health care needs has transcended from being an age long tradition in Africa, into being a major influencer of modern medicine globally. The emergence of modern drug development and discovery depends greatly on indigenous knowledge of the use of medicinal plants (Yuan et al., 2016; Oyeyemi et al., 2019). The retrieval of these indigenous knowledge has been made possible by collective efforts of ethnobotanists, anthropologists, botanists, indigenes of communities, traditional medicine practitioners, academic researchers and other individuals or professionals. Ethnobotanical and ethnomedicinal surveys reports reveal that hundreds of thousands of plant species are used in traditional medicine systems, however, only limited number of plant species have been explored for their phyto-constituents and pharmacological properties in order to elucidate the safety and efficacy of such remedies (Yuan et al. 2016;). This review is aimed at bringing together information on the ethnomedicinal uses of Musanga cecropioides available in literature and also scientific works carried out on the different parts of the plant with the purpose of identifying scientific gaps that might exist in the investigation of the different parts of the plant. The data generated in this review was gathered from textbooks, plant database websites, and journal articles.

Taxonomic Classification
Musanga cecropioides R.Br. ex Tedlie is commonly known as Umbrella tree or African corkwood in English, Parasolier or bois bouchon in French, Oghohen in Bini. Musanga cecropioides belongs to the family Urticaceae (Global Biodiversity Information Facility GBIF, 2017). Musanga cecropioides may be taxonomically classified as follows:

Kingdom: Plantae
Phylum: Tracheophyta
Class: Magnoliopsida
Order: Rosales
Family: Urticaceae  
Genus: Musanga  
Species: cecropioides

*Musanga cecropioides* is reported to have originated from the Democratic Republic of Congo and is also native to Angola, Cameroon, Cote d’ Voire, Ethiopia, Ghana, Liberia, Sierra Leon, Sudan, Togo, Uganda and Nigeria (Burkill, 1985). It has been introduced in Madagascar (Todou and Meikeu Kamdem, 2011). *Musanga cecropioides* are usually fast growing pioneer species of secondary forests (Letouzey, 1985; Sonké, 1998; Betti, 2004). Figure 1 shows the distribution of *Musanga cecropioides* in Africa.

![Figure 1: Map of Africa showing the distribution of Musanga cecropioides (Plantspedia, 2017)](image_url)

**Botanical Description of Musanga cecropioides**

*Musanga cecropioides* is a deciduous, dioecious tree which grows up to the height of 30 m. The trunk is often branchless for up to 15 m of its height with a diameter of about 120 cm, usually with well-developed stilt roots. The leaf is digitately divided into 12-18 spreading segments which are entire, narrow and shortly acuminate and cuneate at the apex and base respectively with petiole of about 110 cm in length. The stipules are hairy and large (7–30 cm long), fused and completely embracing the stem. Flowers unisexual, sessile or with short pedicel. Fruit is yellowish green and succulent (Kadiri and Ajayi, 2009).

**Uses of Musanga cecropioides**

*Musanga cecropioides* is a pioneer specie and with good forest regeneration properties. It is used as a shade or ornamental tree. The wood and bark are used in construction of some household furniture and furniture materials like particle boards and plywood, utensils, sporting goods, rope, paper, crates, musical instruments, toys, fishing equipment and industrial insulation while the boles are made into palm-wine bowls and thin split boards. The wood ash is used in soap making and as vegetable salt. The bark can also be in palm wine preparation as an intoxicant and the stem sap has been used to prepare ink. Edible caterpillars are also collected from the leaves. The flowers also play an important role in pollination while the fruit may be edible and serves as food for some animals (Astaras et al., 2008; Orwa et al., 2009; Todou and Meikeu Kamdem, 2011; Essien et al., 2012).

**Ethno Medicinal Uses**

*Musanga cecropioides* is an important medicinal plant as most of its parts are used in traditional medicine in Nigeria, Cameroun and other countries in Africa. The stipules are used to stimulate menstrual flow, induce childbirth, to treat stomach related issues, hiccup and wounds. The leaves are used to manage hypertension, gonorrhea, cough and in the preparation of vaginal wash to manage painful menstruation (Bouquet, 1969; Burkill, 1985; Ayinde et al., 2003; Orwa et al., 2009; Todou and Meikeu Kamdem, 2011).

A decoction of inflorescence is used to ease labour (Todou and Meikeu Kamdem, 2011). The stem bark decoctions are also useful in the treatment of cough, hypertension, constipation, labour pain, schizophrenia, diabetes, anthelmintic, tuberculosis (in polyherbal formulations), skin diseases and toothache. The bark is used to correct and treat stiffness, lumbago, fever, jaundice, chest pains,
diarrhoea, gastrointestinal disorders and liver diseases (Ayitey-Smith, 1989; Orwa et al., 2009; Adeneye, 2009; Todou and Meikeu Kamdem, 2011; Mabeku et al., 2011).

Stem sap is used to stimulate breast milk production and to ease menstrual cramps (Orwa et al., 2009; Todou and Meikeu Kamdem, 2011). The root bark and kolanut are eaten together to cure cough. Root decoction or infusion is used as anthelmintic (Gill, 1992; Adeneye, 2009; Orwa et al., 2009). Root sap is used to manage and cure diarrhoea, gonorrhoea, vaginal candidiasis, pulmonary complaints, treatment of upper respiratory tract infection (cough), trypanosomiasis, treatment of dirty wounds and skin diseases, otitis, rheumatism, epilepsy, oedema, and in childbirth. It is also used to cure conjunctivitis, headache and as a laxative (Idu et al., 2009; Todou and Meikeu Kamdem, 2011; Isaac, 2012; Uwah et al., 2013). Dike et al., 2012 reported that *Musanga cecropioides* is used to treat malaria, leprosy, as anticonvulsant and anthelmintic, but the various parts used were not specified.

Scientific Studies - Pharmacological reports

Some scientific studies have been carried out on different parts of *Musanga cecropioides*. Ayinde et al. (2006) reported the positive oxytocic effect of *Musanga cecropioides* stem bark aqueous extract, while the uterotonic effect of the leaves was observed by Kamanyi et al. (1992).

The positive hypotensive activity of the crude stem sap, aqueous leaf extract and aqueous stem bark extract have been reported (Kamanyi et al., 1996; Dongmo et al., 1996; Adeneye et al., 2006b; Senjobi et al., 2012; Ajagbonna et al., 2015). Mabeku et al. (2011) reported the antimicrobial activities of different extracts of the stem bark while Uwah et al. (2013) reported the antimicrobial activity of the crude root sap.

Ethanol leaf extract have shown anti-inflammatory activity (Sowemimo et al., 2015) while analgesic activity have been reported with both aqueous and ethanol leaf extracts (Aziba and Gbile, 2000; Senjobi et al., 2012; Sowemimo et al., 2015). Anti-hyperglycemic activity of water, ethanol, water-ethanol extracts of *Musanga cecropioides* stem bark was also recorded (Adeneye et al., 2007; Nyunai et al. 2016). *Musanga cecropioides* crude stem sap was also reported to increase urinary output and sodium excretion in a diuretic study using normotensive Sprague Dawely rats (Ajagbonna et al., 2015). The aqueous extract of the leaves revealed vasodialatory activities (Kamanyi et al., 1991; Aziba, 2005), while the aqueous extract of the stem bark revealed hepatoprotective activities (Adeneye, 2009).

To elucidate the safety of the plant, toxicity studies were carried out on the crude stem sap (Ajagbonna et al., 2015) and aqueous extract of the stem bark (Adeneye et al., 2006a), with no mortality reported in both studies. While Kadiri and Ajayi (2009) carried out anatomical studies on the leaf and petiole of *Musanga cecropioides*.

Microbial and physicochemical studies of *Musanga cecropioides* crude root sap was done by Isaac (2012), in an attempt to determine the portability of the sap used locally in Akwa Ibom state. The study revealed the presence of minerals and heavy metals in acceptable limits and also three pathogenic microorganisms which could be gotten rid of by boiling.

The antioxidant activity of *Musanga cecropioides* leaves and stem bark was investigated using the DPPH radical scavenging assay, the result revealed antioxidant activity comparable to vitamin C which was used as the standard drug (Tchouya and Nantia, 2015; Nyunai et al. 2016).

In reporting the scientific studies carried out on the various parts of *Musanga cecropioides* to elucidate the pharmacological activities of the plant, there is an observed gap as several of the ethnomedicinal uses reported have not yet been validated scientifically.

Phytochemistry

Phytochemicals are biologically active compounds available in the various parts of plants and show therapeutic effects against a number of diseases including asthma, arthritis, cancer and diabetes (Saxena et al., 2013; Banu and Cathrine, 2015). The beneficial physiological and therapeutic effects of plant materials typically results from the combinations of the phytochemicals present in the plant. Several phytochemical compounds have been identified in different plants, some of which are broadly grouped as alkaloids, tannins, saponins, flavonoids, phenols and terpenoids. In elucidating the efficacy of medicinal plants, it is expedient to identify the phytochemicals present in the plant materials. The phytochemicals identified in *Musanga cecropioides* parts are given below.

1. Stem bark: alkaloids, phenolic compounds, catechic tannins, flavonoids (or bioflavonoids), triterpenes, sterols, coumarins, tannins (gallic), free and bound anthraquinone, saponin and cardiac glycosides have been identified in methanol, water/ethanol, ethanol and water extracts (Adeneye et al., 2006a; Kadiri and Ajayi, 2009; Mabeku et al., 2011; Tchouya and Nantia, 2015; Nyunai et al., 2016).
3,4-dihydroxybenzoic (Protocatechuic acid) and 3,4-dihydroxybenzaldehyde acid (Protocatechualdehyde) have also been isolated from phenols present in the stem bark of Musanga cecropioides (Ayinde et al., 2007). While methyl kalaate (Kalaic acid), methyl oleanolate, methyl ursolate and 1, 2, methyl pomoliate have been isolated from saponin present in the stem bark of Musanga cecropioides (Lontsi et al., 1998a).

2. **Adventitious root sap**: total oxalate, soluble oxalate, tannin, saponin have been identified in crude adventitious root sap of Musanga cecropioides (Uwah et al., 2013).

3. **Stem sap**: Alkaloids, tannins, cardiac glycosides, flavonoids, anthraquinones, phlobatannins, anthocyanosides, saponins, cyanogenic glycosides and reducing sugar have been identified in the crude stem sap of Musanga cecropioides (Ajagbonna et al., 2015).

4. **Leaves**: coumarins, flavonoids, phenols, triterpenes, tannins (gallic), alkaloids, free and bound anthraquinone, saponin and cardiac glycosides have been identified in water/ethanol and ethanol extracts of Musanga cecropioides leaves (Kadiri and Ajayi, 2009; Tchouya and Nantia, 2015).

5. **Root**: 2α,11α-diacetoxyl-3β, 19α-dihydroxyurs-12-en-28-oic acid, methyl tormentate, methyl 2-acetyltormentate 28-glucosyl tormentate, methyl pomoliate, methyl musangicate, euscaphate, Musancripoc acid A and B and cecropiacic acid, have been isolated from triterpene found present in the root of Musanga cecropioides (Lontsi et al., 1991a; Lontsi et al., 1991b; Lontsi et al., 1992; Lontsi et al., 1998b).

**Mineral Elements Present**

Minerals elements are inorganic substances required by the body in small amounts for a variety of functions. They are components of enzyme systems and are essential for nervous system function. The body requires different amounts of each mineral and imbalance or deficiency of these elements have been linked to metabolic abnormalities and diseases. Plants are known sources of the mineral elements, it is also important to determine the concentration of heavy metals

The studies on the elemental composition of Musanga cecropioides root sap indicated the present of important mineral elements (Calcium, Phosphorus, Magnesium, Potassium, Sodium, Zinc, Iron, Copper and Manganese) in appreciable quantities and also the low concentration of toxic heavy metals such as Cadmium, Lead, Nickel, Mercury, Cromium, Vanadium (Isaac, 2012; Uwah et al., 2013). However, the other parts of Musanga cecropioides need to be evaluated for mineral element composition.

**Further Research Areas Recommended by Previous Authors**

Several recommendations have been made by few researchers with regards to exploring the pharmacological potentials of Musanga cecropioides. Pharmacological activities recommended for further research include antioxidant activities, hypoglycemic activity, hepatoprotective principle, adrenergic and analgesic effects (Aziba and Gbile, 2000; Adeneye, 2009; Senjobi et al., 2012; Nyunai et al., 2016). To better ascertain the phytocompounds responsible for each pharmacological activity, the need for isolation, identification and purification of phytochemical compounds have suggested (Adeneye, 2009; Senjobi et al., 2012; Nyunai et al., 2016). Also, Adeneye et al. (2006b) further suggested that studies are carried out on the phytochemical and elemental constituents of the stem bark as well as the toxicity.

The contributions of identified authors have been summarized in this review article, however, there seems to be a dire need for more studies to be carried out on this plant. For example, none of the reported ethnomedicinal uses of the flowers, stipules, fruit and root have been investigated in other to determine the efficacy. Bioactive components of some parts reportedly used ethnomedically have not been investigated. It is recommended that future studies should target exploring the wound healing, antimicrobial, antiviral, antidiabetic, anti-tussive, anti-asthmatic, antidiarrheal, antinflammatory, antimalarial and anticonvulsant properties of Musanga cecropioides parts. The toxicity profile of the plant should also be well documented. Detailed phytochemical studies and nutrient profiling should also be carried out using modern techniques such as Gas chromatography-mass spectroscopy and High Performance Liquid Chromatography.

**CONCLUSION**

*Musanga cecropioides* is a plant species of immense phytomedical and economic potential. However, most of the ethnomedicinal claims outlined in various publications have not been scientifically validated. This review focused on exploring what has been done on this valuable plant and exposing the gaps in scientific evaluation of the plant that needs to be filled. Subsequent research works would be targeted at validating the ethnomedicinal claims associated with this plant.
REFERENCES


