

Alchornea Cordifolia, a Special Plant for Traditional Medicine: A Review

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Abstract—The diverse species of plants in Kingdom Plantae has been used for medicinal purposes since ancient time. These plants have also been sources for manufacturing new drugs in pharmaceutical industry due to the secondary metabolites present in their extract. *Alchornea cordifolia*, a perennial evergreen shrub or small tree, is a plant from Euphorbiaceae family, widely used in the area of distribution for the treatment of many diseases. Phytochemical composition of different plant part reveals the presence of secondary metabolites involved in the treatment of certain diseases. The common secondary metabolites present in all part are terpenoids, steroid glycosides, flavonoids, tannins, saponins, imidazopyrimidine alkaloids, alchorneine, alchornidine and several guanidine alkaloids. Many studies also highlighted some pharmacological activity related to *Alchornea cordifolia* plant materials. They have been used mainly for Anti-diabetic, analgesic, anxiolytic, anti-inflammatory, spasmolytic, bacterial, antimicrobial, anti-diarrhoeal, anti-malarial and antioxidant activity. The present article regrouped few data regarding agronomic aspect, propagation, medicinal use and pharmacological activity of the plant. It also requested on the need of further in -vivo experiments and clinical studies in related to drugs development.

Keywords: *Alchornea cordifolia*, photochemistry, pharmacology, drug development.

1. INTRODUCTION

The Euphorbiaceae family is represented by almost 10,000 species, which are divided into 300 genres. It is known to be one of the most widely families that counted angiosperms group. The agronomic aspect of this family is either in the form of trees or shrubs and creepers. Plants present in this family differ both by their vegetative aspect as well as by the structure of their flowers [1] The species of Euphorbiaceae are mostly comprised of herbs, but they may also be shrubs or tree, usually found in the tropics, in which some are succulent in nature such like cacti [2]. Within the family, the genus *Alchornea* is found to be small genus in nature and commonly located in Africa continent [3].

Alchornea cordifolia is native to Senegal, a North-western country in Africa, to Kenya, an East African country and south Tanzania and also throughout Central Africa including Angola (Fig. 1a). In tropical Africa the plant is present in secondary forest, where it grows very close to water, moist or marshy places and to a significant height, which remained in a shrubby or scrambling habit [4].

Alchornea Cordifolia is also called *Alchornea cordifolia* Benth, *Schousboea cordifolia* Schumor thonn. In Cameroon, a West African country, the plant is called *Libo'owhile* by the "Bakoko" ethnic group. The "Bambara" people in Mali called it *kôgira*, *kounaninkala*, *Dunféké*, *Konossasa*, *Moridaba* [5]. Other names of *Alchornea Cordifolia* are Dove wood (English), *Arbre de djeman* (French), *Bugi-bugi*, *bunce*, *pô d'arco* (Portuguese) [6].

Taxonomy of *alchornea cordifolia*

Kingdom: Plantae

Subkingdom: Tracheobionta (vascular plant)

Superdivision: Spermatophyta (seed plants)

Division: *Magnoliophyta*

Class: *Magnoliopsida*

Sub class: Rosidae

Order: Euphorbiales

Family: *Euphorbiaceae*

Gender: *Alchornea*

Species: *Alchornea cordifolia*

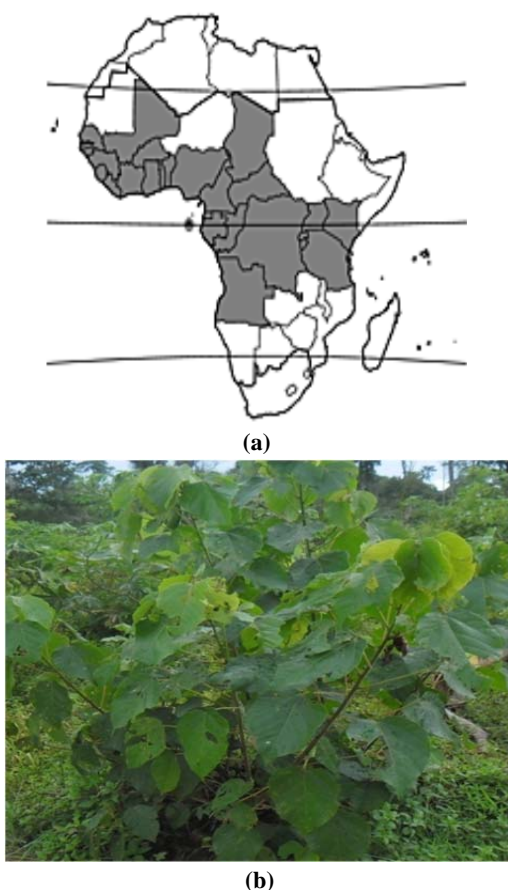
2. BOTANY OF ALCHORNEA CORDIFOLIA

Alchornea Cordifolia is a perennial evergreen shrub or small tree that grows up to 4 -8 m high, with young erected shoots, which later become horizontal, hollow and glabrous [7]. The

plant has a woody stem with many branches carrying leaves and bushy when young. The leaves are simple, alternate broadly - ovate and 10 - 28cm long and 6.5 - 16.5 cm wide, with a smooth blade generally coated with few glands at the base [7] (Fig. 1b). The flowers are unisexual and sessile. The male flower have 2 cup-shaped sepals and 8 stamens. While the female flowers are identified with 2 - 4 lobed calyx. The fruit possess a 3-lobes capsule that are usually green or red with ovoides seeds [8].

Alchornea Cordifolia presented a sexual reproduction (propagation by seed) and asexual reproduction (vegetative propagation from stem cuttings). Plants are most easily propagated from stem cuttings, which develop its root in 9 weeks. When grown from seed, germination takes about 3-12 weeks, if directly planted in moist soil [9].

Alchornea Cordifolia is consumed and considered as medicinal plant. For this purpose, all useful parts of the plant are harvested fresh. They are used freshly time or sun dried away for later use. The leaves represent the parts mostly used, but also other parts like stem bark, stem pith, leafy stems, root bark, roots and fruits are used in traditional medicine [8].



**Fig. 1: a - Geographical repartition of *Alchornea Cordifolia*
b- *Alchornea Cordifolia* in natural habit**

Fig. 1 show the geographical distribution of *Alchornea Cordifolia* and the aspect of the plant in a natural environment

3. USE OF *ALCHORNEA CORDIFOLIA* IN TRADITIONAL MEDICINE

The infusion of leaves is used in the treatment of respiratory problems such as sore throat, cough, bronchitis and intestinal problems such as gastric ulcers, diarrhoea, amoebic dysentery and worms. The poultice of the leaves is also used for the treatment of wounds. External application of the leaves and root bark of *Alchornea Cordifolia* are used for treatment of leprosy and as an antidote for snake bite [10].

Alchornea Cordifolia root and bark are used to increase sexual performances in animal production among the people of Congo in Africa sub-region.

Their leaves are dried and ground to obtain powder which will be mixed in food or macerated in palm wine as reported by [11].

In some African countries like Senegal, the leaf extracts from *Alchornea Cordifolia* is used to treat various ailments like venereal diseases, conjunctivitis, dermatoses, stomach ulcers, bronchitis; in Zaire it is used to treat urinary tract infections, wounds infections, diarrhoea, cough, dental caries, chest pain and anemia; in Sierra Leone, it is used to treat diarrhoea and piles and in Nigeria it is used to treat gonorrhoea, yaws, rheumatic pain and cough [12].

Table 1: Traditional use of *Alchornea Cordifolia*

PART USED	TYPE OF PREPARATION	TRADITIONAL USE
Leaves -	Maceration in - palm wine	Intestinal diseases and gonorrhea [13]
Leaves -	Maceration -	hypertension [14]
Leaves -	Decoction -	Sexually transmitted diseases [15]
Leaves -	Juice -	Dermatitis, herpes and ringworm [16]
Leaves -	Decoction -	Cough, bronchitis, headache, Angina dysentery, Fever, malaria, diarrhea, ring worm and intestinal parasites [17]
Leaves	Infusion -	Prostatitis [18]
Leaves -	Decoction -	Febril convulsion in children [19]
Bark, leave and roots -	Decoction /maceration -	gastrointestinal, respiratory, and urinary tract; also use for worm [8]
Stem, bark, leaves, male inflorescences, - root	Decoction/infusion	hypoglycemia ,jaundice; wounds and umbilical abscess [20;21]
Leaves and bark	Not specify -	Male infertility [22]

Table 1 shows the use and the type of preparation of different parts of *Alchornea Cordifolia* plant part in traditional medicine

4. PHYTOCHEMICAL COMPOSITION OF *ALCHORNEA CORDIFOLIA*

Previous phytochemical studies of the plant reveal the presence of terpenoids, steroid glycosides, flavonoids, tannins, saponins, carbohydrate and imidazopyrimidine alkaloids, alchorneine, alchornidine and several guanidine alkaloids. These components (secondary metabolites) are present in all parts but are mostly represented in the leaves [8]. The leaves also contain a range of hydroxybenzoic acid, namely, gallic acid and its ester, anthralinic acid, protocatechuic acid and ellagic acid. Alchornoic acid has also been found in the seed oils [10]. In addition of to this, stigmaterol, stigmasta - 4, 22-dien-3-one, friedelin, friedelane, 3-*O*-acetyl-aleuritic acid, 3-*O*-acetyl-erythrodiol and methyl-3, 4, 5- trihydroxybenzoate (methyl gallate) are also contained in *Alchornea Cordifolia* leaves [23].

5. PHARMACOLOGY OF *ALCHORNEA CORDIFOLIA*

Anti-diabetic activities of *Alchornea Cordifolia*

[24] explored the effects of n-butanol fraction of the leaves of *Alchornea cordifolia* in streptozotocin-induced diabetic wistar rats. They found that the leaf extract of *Alchornea cordifolia* induced a dose dependent with significant decrease ($P < 0.05$) in the blood glucose level

When treated with the dose of 200, 400 and 800 mg/kg body weight (b w). It is then suggested that to perform this anti-diabetic action, the extract may act on β -cells or may assist the cellular utilization of glucose. On the other hand, the 70% (v/v) ethanolic extract of *Alchornea cordifolia* leaves significantly decrease the fasting blood sugar level ($p < 0.05$) when administered orally at the dose 250 and 500 mg/kg [25]. [24] and [25] explained that this anti -diabetic activity could be attributed to flavonoids, a secondary metabolite present in the leaves extract.

Anti-inflammatory activities of *Alchornea Cordifolia*

In traditional medicine, *Alchornea cordifolia* leaves are used for its anti-inflammatory properties. This was supported by the study of [26] who investigated the anti-inflammatory activity of the methanolic leaves extract of *Alchornea cordifolia* and observed that the topical ointment of the extract at different dose 2000, 1000 and 500 g/cm² is followed by a dose-dependent anti-inflammatory response and attributed this activity to flavonoids and tannin. However a reduction of oedema (anti-inflammatory activity) ($P < 0.001$) of aqueous methanolic leaves extract has also been reported by [27] who on the contrary did not attribute this effect to flavonoids but to terpenoids and tannins. Nevertheless these two studies were

joined together with the findings of [28] who stated that the leaves and root bark of *Alchornea cordifolia* are rich in sitosterol, daucosterol, di (2-ethylhexyl) phthalate, acetyl aleuritic acid, and guanidine alkaloids. This compound may have additional and/or synergistically action with previous metabolites for anti-inflammatory effect.

Anti-microbial activities of *Alchornea Cordifolia*

Anti-microbial activities have been attributed to *Alchornea cordifolia* and several studies have been conducted with this regard. The aqueous and ethanolic leaves extract of *Alchornea cordifolia* exhibit positive antibacterial activity when tested on *Helicobacter pylori*, *Salmonella Typhi*, *Shigella flexneri*, *Salmonella Enteritidis* and Enterohaemorrhagic *Escherichia coli*. In addition, aqueous extract of *Alchornea cordifolia* leaves present bacteriostatic and bacteriocidal potential against these bacteria's respectively at 150 and 300 mg/ml [29]. More aqueous extract of the leaves is found to act positively against gram positive and gram negative bacteria. This shown that the leave extract may have an extensive spectrum and thus justified and supports the use in traditional medicine again bacterial infectious diseases [30; 31].

[32] revealed that the aqueous and ethanolic bark extract of *Alchornea cordifolia* exhibit anti-diarrhoeal activity by reducing significantly ($P < 0.05$) and dose dependently weight of stool in rat when administrated at the dose 200 mg/kg and 400 mg/kg. This effect is performed probably by delaying the transit time of fecal, thus increasing water absorption in the intestine. This action may be attributed to tannins, reducing sugars, sterols, flavonoids and triterpenes present in the extract.

Others activities of *Alchornea Cordifolia*

Additional Studies on *Alchornea cordifolia* also revealed several biological activities. [33] found that the hydroethanolic extract of *Alchornea cordifolia* on mice present antidepressant-like effect. The leaves extract of *Alchornea cordifolia* administered intraluminally to mouse slowed up the intestinal transit, reticent the liberation of diarrhoeal faeces and alter the fluid and electrolyte transit through the colonic mucosa [34]. *Alchornea cordifolia* possessed anti-inflammatory, anxiolytic and analgesic potential [26; 35; 36].

6. CONCLUSION

Alchornea cordifolia is a plant commonly found in Central Africa. The plant is rich in secondary metabolite that transform it into a plant with broad spectrum and can be used in traditional medicine for several disease treatments. It possess many pharmacological property, making it a good starting point for manufacturing of many drugs. Unfortunately, it was notice that, there are limited information about *in vivo* and clinical experiments regarding *Alchornea cordifolia*.

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