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**Review on secondary metabolites and therapeutics activities of Acacia nilotica used in African phytomedicine**

**ABSTRACT**

Today, more than 80% of the West African population use traditional medicine in case of illness. However, several research studies are carried out in order to improve animal health, especially about antimicrobial resistance and vaccine failures observed in farms. This study aimed to review findings about secondary metabolites and therapeutics activities of *Acacia nilotica* used in African phytomedicine. Information has been searched on databases such as Agora, Hinari, Google Scholar, various journals, books and articles. Information capitalized are about traditional use of *A. nilotica*, antiviral, antifungal, antiparasitic, antibacterial, antiparasitodal agents, anti-inflammatory and anti-hypertensive activities of the plant. These notions constituted help for better management of disease and other research perspectives like *in vivo* test of *Acacia nilotica* extracts on viral pathologies in Animal health.

**Keywords:** *Acacia nilotica*, Review, Traditional use, Pharmacological activities.

**INTRODUCTION**

Ethnomedicine and the African veterinary pharmacopoeia, as an art and science stemming from African practice and cultures, are practiced and transmitted within society and their content remains a heritage either of a family or of a particular social group in the village or region [1]. Today, more than 80% of the West African population use traditional medicine in case of illness [2]. Health care therefore depends very much on medicinal plants and the local knowledge associated with them [3,4]. Currently, numerous and rigorous scientific work are trying to develop this ancestral art of diagnosis and treatment of livestock diseases [5]. However, in the African countries, domestic animals continue to pay a heavy price for various pathologies despite the import of veterinary drugs, which are at very uncompetitive costs [6]. Each year, the flock of poultry, small and large ruminants, pig, rabbits and other animal species are threatened. However, several research studies are carried out in order to improve animal health, especially about antimicrobial resistance and vaccine failures observed in farms. The mission of Akogunm and colleagues [7] listed 2807 plant species used in traditional Beninese medicine, including *Acacia nilotica*. The same plant was identified during the census of 2500 plant species in Togo [8]. Therefore, many pharmacological investigations have been carried out on *Acacia nilotica*. The purpose of this document is to provide a bibliographic overview of the properties of *A. nilotica*, used throughout African countries in the control of bacterial, parasitic and viral diseases in both human and animal health. Indeed, authors have reported various properties as antiviral, antifungal, antiparasitic, antibacterial, antiparasitodal, anti-inflammatory and anti-hypertensive.

**MATERIAL AND METHODS**

The present review article involved secondary data analysis. Information has been searched on databases such as Agora, Hinari, Google Scholar, various journals, books and articles [9].

**RESULTS AND DISCUSSION**

**Botanical description of Acacia nilotica**

The genus Acacia belongs to the Leguminosae family, subfamily of Mimosoideae. The classification of the current species comes up against the continuous character of the variation of the characters within this genus. There are, however, three sub-genera with several sections [10].
s. g. Aculeiferum (strong thorns, seeds without albumen)

- s. g. Heterophyllum (bipinnate leaves or phyllodes, seeds with albumen traces, absence of aril)
- s. g. Acacia (thorny stipules, specialized cytological characters).

Acacia is a large pantropical genus, which includes more than 1,300 species, most of which (more than 900 species) are found in Australia, more than 200 species in America, and about 130 species in Africa. Acacia nilotica belongs to the subgenus Acacia, which includes all African species of Acacia with straight thorny stipules. The different scientific names of Acacia nilotica are Acacia nilotica var. Adstringens (Schum. Et Thomm.); Acacia nilotica var. Adansonii (Guill. Et Perrott) and Acacia nilotica var. Tomentosa (Benth) A. F. Hill [11, 12].

Synonyms and systematic of Acacia nilotica

We recorded seven synonyms of A. nilotica

- Acacia arabica (Lam) var nilotica (L.) Benth,
- Acacia arabica Willd,
- Acacia scorpioides (L.) var. nilotica (L.) A. Chev,
- Acacia scorpioides (Linn.) W. F. Whight,
- Mimosa scorpioides (Li),
- Mimosa nilotica (Linn),
- Mimosa Arabica (Lam).

The systematics of A. nilotica are as follows [13]: A. nilotica belongs to:

- Reign: Vegetable
- Group: Eukaryotes
- Branching: Spermaphytes
- Subbranch: Angiosperms,
- Class: Dicotyledons
- Subclass: Dialypetales
- Order: Caliciflores
- Suborder: Legumes
- Family: Mimosaceae
- Gender: Acacia
- Species: nilotica

Common names

English: Egyptian mimosa
French: Gonakier, Acacia nilotique, Acacia du Nil

Vernacular names [14]

- BENIN : gbanni, vanli (Goun et Fon), gaudi (Peuhl)
- TOGO : boni (Ewe)
- BURKINA-FASO : bagana (Bambara), pegengá (Moore), soediele (Lyele), gawdi (Fullfulde)
- SENEGAL: nebnep (Wolof), bagana iri (Bambara)
- MALI: bagana (Bambara), bagana jiri (Malinké-Dioula)
- NIGERIA: bagawura (Haussa)
- GHANA : Odanwoma (Akan)

Habitat and geographic distribution

Acacia nilotica is widespread in the northern savannah regions. Its range extends from Mali to Sudan and Egypt. It requires a well-lit environment for its growth. Raw frost affects small seedlings and large trees. It is drought tolerant and grows best on rough, flat or slightly wavy alluvial soils and in ravine areas. It is considered a noxious weed in South Africa [14].

Plant description

Acacia nilotica is a tree, 10 to 12 m tall that can reach 20 m in the wetland with a straight cylindrical bole (Figure 1). The crown has a rounded appearance. The dark brown bark is deeply cracked in a striated fashion. The branches are olive green or brownish. The thorns, arranged in pairs at the base of the leaves, are straight when they are long and, sometimes hooked when they are short [12].

Figure 1: Whole plant of Acacia nilotica

The leaves are gray green, alternate and composed bipinnate with 2 to 14 pairs of pinnae (Figure 2). The petiole is 0.5 to 2.5 cm long. The spine carries 2 to 8 pairs of pinnales long from 10 to 15 mm. The leaflets are composed of very fine leaflets with 2 to 8 pairs of long pinnales of 9 to 26 mm [15, 16]. The flowers of Acacia nilotica are golden yellow in color, sometimes in balls at the top of the twig (Figure 2). They are bisexual or male. The calyx lobes are 1 to 2 mm long, the corolla lobes are glabrous or pubescent. The stamens are numerous, free up to 6 mm long. The ovary is superior. The style is long and thin [15].

Figure 2: Leaves and flowers of Acacia nilotica

The fruits of Acacia nilotica are pubescent, greyish-colored pods (Figure 3). They are oblong to linear, flattened, straight or curved, with entire edges or deeply compressed between the seeds. They contain 4 to 10 seeds. The location of the seeds is clearly marked by clear protrusions on the pod valves [15, 16].

Figure 3: Fruits of A. nilotica
**Chemical composition of Acacia nilotica**

Phytochemical screening of Acacia nilotica has shown the presence of tannins, saponosides and flavonoids in fruit [17]. Furthermore, Mansouri et al. [18] reported in addition to these compounds, cardiac glycoside, mucilage, oses and holosides. Benbrahim et al. [19] report that Acacia nilotica is a plant with a high content of tannins, a compound present in almost all the different parts of the plant. According to Ndiaye [17], Acacia nilotica fruits are sources of tannins and gallic acids. However, the study of Kheraro and Adam [11] has shown that the root bark contains 36% tannins and the pods on average of 30%. These results are confirmed by Adewoye and Rao [14] who report the same percentage of tannins in pods.

In addition, Diagne [19] reports that the seeds of Acacia nilotica are rich in proteins, lipids containing several fatty acids (palmitic acid, oleic acid, arachidonic acid) and in mineral matter (potassium, calcium, sodium, magnesium and iron ). Moreover, Sharma et al. [20] reports that the phytochemical study of the hydroalcoholic extract of Acacia nilotica reveals the presence of carbohydrates, glycosides, phytosterols, phenolic compounds, saponins and flavonoids as being major constituents of the plant. The same results have been found in the research of Raghavendra et al. [21], Solomon-Wisdom and Shittu [22] and Kalaivani et al. [23].

**Traditional uses of Acacia nilotica**

Acacia nilotica is used in many cultures to treat bronchitis, chest pain, colds, diarrhoea, dysentery, fever, haemorrhages, leprosy, eye disorders, pneumonia, sore throat [24, 25], syphilis [25, 26]; oral thrush, fungal skin infections [27, 28], malaria and toothache [29, 30]. Bark decoction is used to treat pre, intra and postpartum complications [31, 32] and root bark decoction is used for gastrointestinal complications and babesiosis [33]. The fruits are used against scabies [34]. The ancient Egyptians used it as a dewormer against internal bleeding, diarrhoea and dermatological problems [35]. In Africa, it is used as a haemostatic, healing ulcers, calming coughs [36], anti-diarrheal and anti-dysenteric infants, in mouth ulcers and gingivitis and also against eye inflammation [37]. Several species of Acacia are often used as reserve fodder in arid areas and for his forage value [38]. In veterinary, breeders used A. nilotica to treat foot and mouth disease syndrome [38]. It is also used, mixed with sodium bicarbonate, in racehorses suffering from tendinitis. Other authors also claim that acacias provide very good quality charcoal among which we have Acacia nilotica [39], Diallo [19], through a survey of traditional healers in Mali (Toumbouctou region) reported that Acacia nilotica is used in various diseases. The table below summarizes the results related to this plant.

**Table 1: Affection treated by Acacia nilotica according to traditional healers in Toumbouctou (Diallo, 2005)**

| Affection                              | Recipe and treatment                                                                 | Duration of treatment |
|----------------------------------------|--------------------------------------------------------------------------------------|-----------------------|
| Inflammation of the tooth              | Cut Acacia nilotica fruit into small pieces and then place them on the tooth. Repeat after each meal. | 3 days                |
| Pruritus and sores                      | The fruits or pods of Acacia nilotica are dried, pulverized, sieved and then mixed with a little water. The mixture obtained is thus applied to the wound or pruritus. | Apply the treatment until healing |
| Eye infection                          | The fresh or dried leaves of Acacia nilotica are made into a decoction in two tea glasses containing water. After cooling, the decoct is filtered and then 2 to 3 drops of the filtrate are applied every day to the eye. | 3 days                |
| Postpartum hemorrhage in women         | Put in a decoction in a liter and a half of water, a handful of fresh leaves of Acacia nilotica. Then give a quarter of a liter of the decoct with fresh milk 3 times a day. | 7 days                |
| Dental pain in children accompanied by: diarrhea, vomiting, inability | Combine the fruits of Acacia nilotica with the seeds of Cuminum simum and the seeds of Khaya senegalensis then infuse. The infused is to be drunk once in the evening. | 3 days                |
| Diarrhea                               | Put in a little sugar water 5 g of the powdered fruit of Acacia nilotica. Drink the mixture once in the evening. | 3 days                |

However, Al Mustafa and Dafallah [40] reported risks of constipation following prolonged use of the decoction of the fruit of Acacia nilotica.

**Biological and pharmacological activities of Acacia nilotica**

- **Antiviral activities**
  
  Antiviral activities related to Acacia nilotica fruits are reported by Mohamed and Abdelrahman [41] with regard to Newcastle disease and avian plague (Avian influenza). The methanolic extracts from the pods have shown their efficacy against HIV-PR [42]. Likewise, Hussein et al. [43] report that the methanolic extracts of the pod and bark powder are also inhibitors of the HIV-1 protease viruses. In addition, Hussein et al. [44] revealed in their study that parts of the fresh plant are reputed to be active against hepatitis C.

- **Antibacterial activities**
  
  The aqueous extracts of Acacia nilotica have shown antibacterial properties in vitro [45]. The study of Atefeibu [46] revealed an antibacterial property from aqueous extracts of the fruits of the plant. These cause an important zone of inhibition at the concentration of 10 mg / ml on Salmonella ordenez, Shigella flexneri, Escherichia coli, Pseudomonas aeroginosa and Staphylococcus aureus. Similarly, broad spectrum antibacterial effects are reported by Abd El Nabi [47] and Srinivasan et al. [27]. Al Mustafa and Dafallah [39] justify the antimicrobial activity of Acacia nilotica against Gram positive and negative bacteria due to the phytochemicals of the plant. Nilotican, a diterpene isolated from the bark, has shown antibacterial activity against Gram-positive bacteria Bacillus subtilis and Staphylococcus aureus [47].

- **Antiparasitic activities**
  
  The tannins contained in extracts of Acacia nilotica have shown alcidal and molluscicidal effects against Bulinus truncatus and Biomphalaria pfeifferi snails from freshwater [48]. These results are confirmed by the studies of Bashir et al. [49]. Indeed, the powder is used as it is or extracted with ethyl acetate. The molluscicidal action is obtained by spraying the etheral extract or the pod powder in lakes containing molluscs. This powder acts strongly on certain intermediate hosts of schistosomes such as: the planorbid (Biomphalaria pfeifferi) intermediate host of Schistosoma mansoni, the bulin (Bulinus
truncatus) intermediate host of Schistosoma haematobium. El-Tahir et al. [50] and Jigam [51] have demonstrated that Acacia nilotica has antimalarial activity on Plasmodium falciparum. In addition, the tests carried out by Ngom [52] with the decocted powder of the pods of Acacia nilotica var. adstringens in people living with HIV in Dakar, revealed an antifungal activity comparable to that of fluconazole in the treatment of bucco-esophageal candidiasis. The hydroalcoholic extract of Acacia nilotica also has antifungal activity at high concentrations on Candida albicans, Aspergillus fumigatus and Aspergillus niger [19]. In addition, this author claims that the proliferation inhibition observed for Aspergillus fumigatus and Aspergillus niger is comparable to that of Fluconazole, a reference molecule in the treatment of fungal diseases. Other studies have also shown that different extracts from the plant have broad-spectrum antifungal effects [53]. Different extracts of the root bark and fruits have been shown to have a particular antifungal activity against yeasts and Candida albicans [54, 55].

- Healing activities

The research of Shah et al. [56] have shown that the methanolic extract of Acacia nilotica fruits exerts an anti-platelet aggregation effect by blocking calcium channels. This would explain the use of the plant as a healing agent by traditional healers.

- Analgesic activities

Faye [57] in his study about the analgesic activity of the aqueous, chloroformic and ethyl acetate fractions of the hydroalcoholic extract of the pods of Acacia nilotica var adstringens in mice reports that the doses of 30 mg / kg and 100 mg / kg of the extract significantly reduce the number of contortions induced by the injection of acetic acid. This study reveals that the chloroform fraction shows greater analgesic activity than that of the aqueous fraction and that of ethyl acetate. In addition, the inhibition profile of the number of contortions of the chloroform fraction at 100 mg / kg is comparable to that of Aspirin® taken as a reference analgesic for peripheral action.

- Other activities

Studies have reported that Acacia nilotica contains bioactive molecules with anti-hypertensive, antispasmodic, anti-inflammatory, vasoconstrictor, anti-clumping and anti-cholinesterase properties [58-60]. Furthermore, the results of other studies have shown the antioxidant, anti-hyperglycemic properties of Acacia nilotica extracts [61-63], gastroprotective [64] and stimulating secretion and release of prolactin and lactation [65]. The work of Guéye [66] shows that extracts of Acacia nilotica appear to have an effect on the volatile sulfur compounds involved in halitosis. In vitro studies have shown that methanolic extracts from the stem bark, fruit and leaf provide complete protection against diarrhoea caused by castor oil, such as an anti-diarrheal drug, loperamide [67]. These extracts (0.5 to 3 mg / ml) showed a dose-dependent anti-diarrheal effect on the isolated rabbit jejunum with initial relaxation, which was quickly followed by the contraction of the jejunum to 3 mg / ml [68]. Sultana et al. [69] have also shown that bark extracts have antioxidant capacity in vitro, while Shah et al. [56] found that the alcoholic extract has an antagonistic plateau aggregation effect in a dose-dependent manner. Rich phenolic and polyphenolic ether, ethyl acetate and acetic fractions of the bark showed antimutagenic and cytotoxic effects in the Ames test [69].

CONCLUSION

The different researches on Acacia nilotica have come to justify the various uses and virtues that endogenous populations have lent it for centuries. Given the different nutrients and properties of this plant, it would benefit from being considered in the efforts to contain cases of bacterial resistance increasingly frequent and to fight against animal viral disease like African Swine fever. Also, several in vivo investigations are needed to corroborate the main activities of the plant. The authors thank the Research Unit in Applied Microbiology and Pharmacology of Natural Substances (U.R.M.A.Pha) of the University of Abomey-Calavi (Benin) and the Centre of Research and Training on Medicinal Plants (CERFOPLAM) of the University of Lomé (Togo), which give access to their library for the provision of documents and information necessary for the writing of this review paper.

REFERENCES

1. Tamboura H, Kaboré H, Yaméogo SM. Ethnomédicine vétérinaire et pharmacopée traditionnelle dans le plateau central du Burkina Faso : cas de la province du Passoré. Biotechnologie, Agronomie, Société et Environnement 1998 ; 2:181-191.
2. Sangare MM, Sina H, Dougnon J, Bayala B, Atego JM, Dramane KL. Étude ethnobotanique des plantes hépatotropes et de l’usage traditionnel de Gomphrena celosioides Mart. (Amaranthaceae) au Bénin. International Journal of Biological and Chemical Sciences 2012; 6:5008-5021.
3. Sissin B, Tehou A C, Daouda I, Saidou A. Abundance and species richness of larger mammals in Pendjari National Park in Benin. Mammalia. 2002; 66:369-380.
4. Fyhrquist P. Traditional medicinal uses and biological activities of some plant extracts of African Combretoon Loeft, Terminalla L. et Pteleopsis Engl. Species, 2007.
5. Ogni CA, Kpodékon MT, Dassou HG, Boko CK, Koutinhoun BG, Dougnon JT et al. Inventaire ethnopharmacologique des plantes utilisées dans le traitement des pathologies parasitaires dans les élevages extensifs et semi-intensifs du Bénin. International Journal of Biological and Chemical Sciences. 2014; 8:1089-1102
6. Dassou GH, Yédomonhan H, Adomou AC, Ogni CA, Tossou GM, Akoègninou A. Facteurs socioculturels et environnementaux déterminants la connaissance ethnovétérinaire au Bénin. Afrique Science 2015; 11:335-360.
7. Akoègninou A, Van der Burg WJ, Van der Maesen LJG. Flore analytique du Bénin. Backhuys Publishers, 2006.
8. Adjanohou EJ, Adjakidjé V, Ahyi MRA, Ake Assi L, Akpagana K, Chibon P et al. Contribution aux études ethnobotaniques et floristiques au Togo. Rapport présenté à l’Agence de Coopération Culturelle et Technique, 1986, 526-531.
9. Adouko JS, Soha ASS, Ohouko OF, Dougnon TJ. Review on biological and immunomodulatory properties of Moringa oleifera in animal and human nutrition. Journal of Pharmacology and Phytotherapy 2020; 1:9.
10. Benbrahim KP, Berrada H, El Ghachtouli N, Ismaili M. Les acacias: des plantes fixatrices d’azote prometteuses pour le développement durable des zones arides et semi-arides [Acacia: Promising Nitrogen fixing trees for sustainable development in arid and semi-arid areas]. International Journal of Innovation and Applied Studies 2014; 8-46.
11. Kerharo J, Adam J-G. Plantes médicinales et toxiques des Peul et des Toucouleur du Sénégal. Journal d’agriculture traditionnelle et de botanique appliquée, 1964; 11(10):384-444.
12. Eyog MO, Ndoye O, Kengue J, Awoono A. Les fruitiers forestiers comestibles du Cameroun. International Plant Genetic Resources Institute 2006, 220.
13. Wickens GE. Rôle des acacias dans l’économie rurale des régions sèches d’Afrique et du Proche-Orient. Food & Agriculture Org. 1996, 153.
14. OOA. Pharmacopée d’Afrique de l’Ouest, Edition KS PRINTCRAFT GH. LTD. 2013, 268.
15. Adewoye RO, Rao JB. Acacia nilotica variety adsonansi pods (bagarwuru) of Nigeria. Leu- ther Science 1977; 229-231 (part 1), 293-301 (part 2).
16. Fall A. Etude des activités anti-inflammatoire et analgésique de l’extrait hydroalcoolique des gousses d’Acacia nilotica var. adstringens, Thèse Pharm., Dakar, 2010.
n° 35.
31.
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27.
25.
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20.
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Acacia nilotica comme source de tanins et d’acide gallique. Al-Biruniya. 1994; 10:117-122.

Mansouri LE, Bousta D, Balouiri M, Khanchoufi AE, Pérez RMD, Gonzalez SML et al. Phytochemical screening, antioxidant and antiinflammatory properties of the gum of Acacia nilotica from Southeast of Morocco. International Journal of Pharmacology and Clinical Trials 2014, 12.

Diagne AF. Étude des activités anti-inflammatoire et analgésique de l’extrait hydroalcoolique des gousses d’Acacia nilotica var. adstringens (Mimosaceae). Thèse de Pharmacie, Université Cheik Anta Diop (Sénégal), 2010, 124.

Sharma AK, Kumar A, Yadav SK, Rahal A. Studies on antimicrobial and immunomodulatory effects of hot aqueous extract of Acacia nilotica L. leaves against common veterinary pathogens. Veterinary Medicine International 2014, 9.

Raghavendra MP, Satish S, Raveeisha KA. In vitro evaluation of anti-bacterial spectrum and phytochemical analysis of Acacia nilotica. Journal of Agricultural Technology 2006; 2:77-88.

Solomon-Wisdom GO, Shiitu GA. In vitro antimicrobial and phytochemical activities of Acacia nilotica leaf extract. Journal of Medicinal Plants Research 2010; 4;1232-1234.

Kalaivani T, Rajasekaran C, Suthindhiran K, Mathew L. Free Radical Scavenging, Cytotoxic and Hemolytic Activities from Leaves of Acacia nilotica (L.) Wild. ex. Delile subs. indica (Benth.). Brenan. Evidence-Based Complementary and Alternative Medicine 2011, 298-305. https://doi.org/10.1093/ecam/nep060.

Chhabra SC, Uioso FC. Antibacterial activity of some Tanzanian plants used in traditional medicine. Fittoterapia. 1991; 62:499-503.

Watt JM, Breyer-Branderwijk MG. The Medicinal and Poisonous Plants of Southern and Eastern Africa Livingstone Ltd., Edinburgh 1982: 546.

Kabiru L, Afolayan AJ. An ethnobotanical study of plants used for the treatment of sexually transmitted diseases (njovhera) in Gurre District, Zimbabwe. Journal of Ethnopharmacology. 2001; 77:5-9.

Lev E, Amar Z. Ethnopharmacological survey of traditional drugs sold in the Kingdom of Jordan. Journal of Ethnopharmacology. 2002; 82:131-145.

Srinivasan D, Nathan S, Suresh T, Perumalsamy PL. Antimicrobial activity of certain Indian medicinal plants used in folkloric medicine. Journal of Ethnopharmacology. 2001; 74:217-220.

Jain A, Katewa SS, Galav PK, Sharma P. Medicinal plant diversity of Sitamata wildlife sanctuary, Rajasthan, India. Journal of Ethnopharmacology. 2005; 102:143-157.

Kubmarawa D, Ajoku GA, Enwem NM, Okorie DA. Preliminary phytochemical and antimicrobial screening of 50 medicinal plants from Nigeria. African Journal of Biotechnology. 2007; 6:1690-1696

Kaingku CK, Oduma JA, Kanui TI. Practices of traditional birth attendants in Machakos District, Kenya. Journal of Ethnopharmacology. 2011; 137:495-502.

Kaingku CK, Oduma JA, Mbaria JM, Kiama SG. Medicinal plants traditionally used for the management of female reproductive health dysfunction in Tana River County, Kenya. Tang [Humanitas Medicine]. 2013; 3:17-1.

Nanyingi MO, Mbaria JM, Lanyasunya AL, Wagate CG, Koros KB, Kaburia HF et al. Ethnopharmacological survey of Samburu district, Kenya. Journal of Ethnobiology and Ethnomedicine. 2008; 4:14.

Lev E, Amar Z. Ethnopharmacological survey of traditional drugs sold in Israel at the end of the 20th century. Journal of Ethnopharmacology. 2000; 72:191-205.

Ndiaye A. Contribution à l’étude pharmacologique de deux plantes médicinales de la pharmacopée traditionnelle Sénégalaise: Moringa oleifera Lam. Et Acacia nilotica L. Delile, Thèse de Doctorat en Pharmacie, Université Cheikh Anta Diop de Dakar, 2016, 140.

Vassal J. Les acacias au Sénégal: taxonomie, écologie, principaux intérêts, 1998.

Guinko S. Rôle des Acacias dans le développement rural au Burkina Faso et au Niger, Afrique de l’Ouest. L’homme et Le Milieu Végétal Dans Le Bassin Du Lac Tchad ORSTOM, Paris 1997, 35-51.

Houndje EMB, Ogna CA, Noudede N, Farougou S, Youssao AKI, Kpodekon TM. Recettes ethno-vétérinaire à base de plantes médicinales utilisées pour le traitement de la fièvre aphtueuse au Bénin. International Journal of Biological and Chemical Sciences 2016; 10:2090-2107.

Diallo AM. Étude des plantes médicinales de Niafunké (Région de Tombouctou). Phytotechnie de et pharmacologie de maerua cassifolia Forsk (Capparidaceae) 2005, 85.

Al-Mustafa ZH, Daifallah AA. A study on the toxicology of Acacia nilotica. The American Journal of Chinese Medicine. 2000; 28:123-129.

Mohamed IET, Abdelrahman MEN. The antibacterial, antiviral activities and phytochemical screening of some Sudanese medicinal plants. EurAsian Journal of BioSciences. 2010; 4(1):8-16.

Bessong PO, Obi CL. Ethnopharmacology of human immunodeficiency virus in South Africa-a mini review. African Journal of Biotechnology. 2006; 5:1693-1699

Hussein G, Miyashiro H, Nakamura N, Hattori M, Kazuichi N, Shimotohno K. Inhibitory effects of Sudanese medicinal plant extracts on hepatitis C virus (HCV) protease. Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives 2000; 14:510-516.

Hussein G, Miyashiro H, Nakamura N, Hattori M, Kawahata T, Otake T et al. Inhibitory effects of Sudanese plant extracts on HIV-1 replication and HIV-1 protease. Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives. 1999; 13:31-36.

Abd el NO, Reisinger EC, Reinhalter FF, Stüll F, Eibl U, Krejs GJ. Antimicrobial activity of Acacia nilotica (L.) Wild. ex Del. var. nilotica (Mimosaceae). Journal of Ethnopharmacology 1992; 37:77.

Atefeibu ESI. Contribution à l’étude des tanins et de l’activité antibactérienne de Acacia nilotica var adansonii. Thèse de pharmacie Université de Cheikh Anta Diop de Dakar, Sénégal, 2002, 37.

Eldeen IMS, Van Heerden FR, Van Staden J. In vitro biological activities of niloticane, a new bioactive casseine diterpene from the bark of Acacia nilotica subsp. krausiana. Journal of Ethnopharmacology. 2010; 128:555-560.

Ayoub SH. Molluscicidal properties of Acacia nilotica. Planta Medica 1982; 46:181-183.

Bashir AK, Sulaiman SM, El Sheikh SH, El Kheir YM. Molluscicidal, cercarial and miracidicidal activities of Acacia nilotica sps. nilotica and adansonii. Fittoterapia. 1987; 58:51-56.

El-Tahir A, Satti GM, Khalid SA. Antiplasmodial activity of selected Sudanese medicinal plants with emphasis on Acacia nilotica. Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives. 1999; 13:474-478.

Jigam AA, Akanya HO, Dauda BE, Okogun JO. Polygalloyltannin isolated from the roots of Acacia nilotica Del. (Leguminosae) is effective against Plasmodium berghei in mice. Journal of Medicinal Plants Research. 2010; 4:1169-1175.

Ngom NM. Essai randomisé d’Acacia nilotica versus fluconazole dans le traitement de la candidose buccal osgophagienne chez les personnes vivant avec le VIH à Dakar. Thèse de Pharmacie, Université Cheikh Anta Diop (Sénégal) 2001, 122.

Hamza OJ, van den Bout-van CJ, Matee MI, Moshi MJ, Mikx FH, Selemmani HO et al. Antifungal activity of some Tanzanian plant species traditionally used for the treatment of fungal infections. Journal of Ethnopharmacology. 2006; 108:124-132.

Runyoro DK, Matei MI, Ngasappa OD, Joseph CC, Mbwambo ZH. Screening of Tanzanian medicinal plants for anti-Candida
activity. BMC Complementary and Alternative Medicine. 2006; 6:11.
55. Gupta SC, Bilgrami RS. Inhibitory effect of some plant decoctions on the production and activity of cellulolytic (Cx) enzyme of three pathogenic fungi. Proceedings of the National Academy of Sciences of India. 1970; 40:6-8.
56. Shah BH, Safdar B, Virani SS, Nawaz Z, Saeed SA, Gilani AH. The antiplatelet aggregatory activity of Acacia nilotica is due to blockade of calcium influx through membrane calcium channels. General Pharmacology. 1997; 29:251-255.
57. Faye CD. Étude de l’activité analgésique des fractions aqueuse, chloroformique et d’acétate d’éthyle de l’extrait hydroalcoolique des gousses de Acacia nilotica var adstringens chez la souris, Thèse de Pharmacie, Université Cheik Anta Diop (Sénégal), 2012, 109.
58. Gilani AH, Shaheen F, Zaman M, Janbaz KH, Shah BH, Akhtar MS. Studies on antihypertensive and antispasmodic activities of methanol extract of Acacia nilotica pods. Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives. 1999; 13:665-669.
59. Sultana B, Anwar F, Ashraf M. Effect of extraction solvent/technique on the antioxidant activity of selected medicinal plant extracts. Molecules. 2009; 14:2167-2180.
60. Crowch CM, Okello EJ. Kinetics of acetylcholinesterase inhibitory activities by aqueous extracts of Acacia nilotica (L.) and Rhamnus prinoides (L’Hér.). Afr J Pharm Pharmacol 2009; 3:469-75.
61. Barapatre A, Aadil KR, Tiwary BN, Jha H. In vitro antioxidant and antidiabetic activities of biomodified lignin from Acacia nilotica wood. International Journal of Biological Macromolecules. 2015; 75:81-89.
62. Singh BN, Singh BR, Singh RL, Prakash D, Sarma BK, Singh HB. Antioxidant and anti-quorum sensing activities of green pod of Acacia nilotica L. Food and Chemical Toxicology 2009; 47:778-86. https://doi.org/10.1016/j.fct.2009.01.009.
63. Omara EA, Nada SA, Farrag ARH, Sharaf WM, El-Toumy SA. Therapeutic effect of Acacia nilotica pods extract on streptozotocin induced diabetic nephropathy in rat. Phytomedicine 2012; 19:1059-1067.
64. Bansal VK, Goel RK. Gastroprotective effect of Acacia nilotica young seedless pod extract: role of polyphenolic constituents. Asian Pacific Journal of Tropical Medicine. 2012; 5:523-528.
65. Lompo-Ouedraogo Z, Van Der Heide D, Van Der Beek EM, Swarts HJ, Mattheij JA, Sawadogo L. Effect of aqueous extract of Acacia nilotica ssp adansonii on milk production and prolactin release in the rat. Journal of Endocrinology. 2004; 182:257-266.
66. Gueye M. Impact de Acacia nilotica dans la réduction des composés sulfurés impliquées dans l’halitose: étude auprès de 35 patients Sénégalais, Thèse de Chirurgie dentaire, 2010, 108.
67. Agunu A, Yusuf S, Andrew GO, Zezi AU, Abdurahman EM. Evaluation of five medicinal plants used in diarrhoea treatment in Nigeria. Journal of Ethnopharmacology. 2005; 101:27-30.
68. Sultana B, Anwar F, Przybylski R. Antioxidant activity of phenolic components present in barks of Azadirachta indica, Terminalia arjuna, Acacia nilotica, and Eugenia jambolana Lam. trees. Food Chemistry. 2007; 104:1106-1114.
69. Kaur K, Michael H, Arora S, Härkönen P, Kumar S. In vitro bioactivity-guided fractionation and characterization of polyphenolic inhibitory fractions from Acacia nilotica (L.) Willd. ex Del. Journal of Ethnopharmacology. 2005; 99:353-360

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