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Ahmed HA
Department of Pharmacognosy and Ethnomedicine, Faculty of Pharmaceutical Sciences, Usmanu Danfodiyo University Sokoto-Nigeria

Correspondence
Ahmed HA
Department of Pharmacognosy and Ethnomedicine, Faculty of Pharmaceutical Sciences, Usmanu Danfodiyo University Sokoto-Nigeria

A phyto pharmacological review on a medicinal plant: *Holarrhena floribunda*

Ahmed HA

Abstract
Holarrhena floribunda (G. Don) T. Durand and Schinz (Apocynaceae), commonly called false rubber tree, is a tree that grows up to 17 meters high. The plant is widely distributed in West Africa, where several parts of the plant are used for medicinal purposes. The stem-bark and leaves are used to treat various ailments such as malaria, fever, dysentery, amoebic diseases, diarrhea, infertility, amenorrhea and diabetes. The review of literature revealed the presence of many active phytochemical constituents which may be responsible for the various medicinal uses and pharmacological activities of *Holarrhena floribunda.* According to this review *Holarrhena floribunda* has analgesic, antimicrobial, hypoglycemic, anticancer, antimalarial and Trypanocidal activities.

Keywords: *Holarrhena floribunda,* phytochemical constituents, pharmacological activities, Medicinal uses

1. Introduction
In recent years, there has been a monumental increase in the use of plants medicinally. Medicinal plants are progressively gaining acceptance in both developing and developed countries due to their natural source and minimal side effects. The World Health Organization (WHO) has listed 21,000 plants, which are used curatively worldwide [1]. Plants have proven to be a novel source for bioactive natural products, their ethnopharmacological effects have been used as a primary source for drug discovery [2]. About 25% of the contemporary pharmacological drugs are derived directly or indirectly from plants [3]. Approximately 80% of the plant derived drugs were related to their initial ethnopharmacological purpose. Therefore, screening of medicinal plants is required for the discovery and development of useful bioactive agents for treatment of ailments [2].
Holarrhena floribunda (G. Don) T. Durand and Schinz (Apocynaceae), commonly called false rubber tree, is a tree that grows up to 17 meters high in the deciduous forest and savannah woodland. The plant is widely distributed in West Africa, where several parts of the plant are used for medicinal purposes. The stem-bark and leaves are used to treat various ailments such as malaria, fever, dysentery, amoebic diseases, diarrhea, infertility, amenorrhea and diabetes [4]. The plant contains various phytochemical constituents with potential pharmacological activities such as; holarrhesine, conessine from the bark of the root. The leaves contain holaphylline and holaphyllamine, and other alkaloids: holaphylline, holaphyllamine, holamine, holaphyllinol, holaphyllidine, holadysamine, holarrhesine, conessine, and progesterone [5]. Progesterone and some flavones (robinoside) [6]

2. Common names [7, 8]

Arab	:	ola-ina
Ashanti	:	slae
Attic	:	pri, sohoue
Bambara	:	koumajui
Baoule	:	sebe, sebe.
Bijago	:	ete-exi.
Fulani	:	indama
Hausa	:	bakim mayu, bakim mutum
Ibo	:	okemba
Pehul	:	indama, taraki
Yoruba	:	Ako-ire, are-ibeji, areno, isai

3. Scientific Classification [9]

Kingdom	:	Plantae
Subphylum	:	Euphyllophytina
Infraphylum	:	Radiatopses
Subclass	:	Magnoliidae
Superorder	:	Asteranae
Order	:	Gentianales
Family	:	Apocynaceae
Tribe	:	Malouetieae
Genus	:	Holarrhena
Species	:	floribunda

Binomial name
Holarrhena floribunda
(G.don) T. durand & Schinz

Synonyms
Holarrhena africana A.D.C
Holarrhena floribunda var. tomentella H. Huber
Holarrhena ovata A.D.C
Holarrhena wulfsbergii Stapf
Rondeletia floribunda G.Don

4. Plant Description [10]
Holarrhena floribunda is a shrub to medium sized tree, 4.5-15 m high. The leaves are shiny, mostly ovate-acuminate, or ovate-lanceolate, 5-18cm long and 2-8 cm broad with 6-12 pairs of lateral nerves. Flowers are white, scented and in almost umbel-like inflorescences; corollatube 5-9 mm long and lobes 3.5-8 mm and overlapping to the right. Anthers are fertile to the base. It has paired narrowly cylindrical fruiting follicles, 30-60 cm, with seeds having apical tufts of hair.

5. Traditional Uses
Stem bark: The bark is used as a febrifuge, tonic, as remedy for snake bite and for the treatment of venereal diseases and dysentery. In some parts of West Africa, the bark is used to treat abdominal pains, nausea, indigestion and diarrhea [11].

Roots: The roots of *H. floribunda* are used in the treatment of constipation, colic discomforts and sterility. It is also used to treat diarrhea and dysentery [12]. The root is boiled in milk and used to bathe boys attaining puberty and it is also used as a cure for snakebites and venereal disease [13].

Leaves: The leaves of *H. floribunda* have been used to treat malaria and dysentery, diarrhea, amenorrhea and management of diabetes [12]. The leaves, mixed with those *of Myrianthus arboreus* and fruits of Capsicum in water, are applied as an enema against kidney pain. In Sierra Leone the leaves mixed with kola nut are eaten to treat gonorrhea. The leaf sap is sprinkled on wounds as a haemostatic [14].

Fruit: In Guinea Bissau the fruit is used to prepare a remedy for dropsy. The latex is applied to snakebites [14].

6. Chemical Constituents
The tree yields a large number of alkaloids which are greatest in the roots (2%), decreasing in the stem (1 – 1.5%) and least in the leaves (< 1.0%) [15]. The bark contains a steroidal alkaloid called holarrhesine and conessine from the bark of the root. The leaves contain holaphylline and holaphyllamine, and other alkaloids: holaphylline, holaphyllamine, holamine, holaphyllinol, holaphyllidine, holadysamine, holarrhesine, conessine, and progesterone [5]. Progesterone and some flavones (robinoside) were found in leaf extracts [6]. Trichothecenes namely; 8-dihydrotrichothecinol A, loukacinol A, and loukacinol B and the compounds; trichothecolone, trichothecin, trichothecinol A (6), rosenonolactone, 6β-hydroxyrosenonolactone, rosololactone and lupeol were isolated from stem [16, 17].

7. Pharmacologic activities
7.1. Analgesic activity
Aniefiok Udobre *et al*., 2014 [11] evaluated the analgesic activity of methanol root extract of *Holarrhena floribunda* using thermally induced pains, acetic acid induced writhing and formalin-hind paw licking in mice models. The extract showed significant analgesic effect in all the models.

7.2. Antibacterial activity
The methanolic extract and conessine isolated from the stem bark of *Holarrhena floribunda* were tested for their antibacterial activities on *Bacillus cereus, Bacillus subtilis, Bacillus megaterium* and *Bacillus stearothermophilus* using the disc diffusion method. Conessine exhibited a significant antibacterial effect against all the strains studied comparable to that of chloramphenicol used as reference reported. The ethanolic extract of leaves of *H. floribunda* was active on *Staphylococcus aureus* and clinical strains of *Staphylococcus aureus, Salmonella typhi* and *Klebsiella pneumoniae* [18, 19].

7.3. Anti-cancer activity
The antiproliferative and apoptosis induction potential of methanolic leaf extracts of *Holarrhena floribunda* against breast (MCF-7), colorectal (HT-29), and cervical (HeLa) cancer cells relative to normal KMST-6 fibroblasts was investigated. The MTT assay with combination of the trypan blue dye exclusion and clonogenic assays were used to test for the effects of the extracts on the cells. The result of the MTT assay reveal that all the cells were sensitive to the cytotoxic effects of the plant extract in a dose- and time-dependent manner but the HeLa cancer cells, show more sensitivity to the plant extract [13].

7.4. Hypoglycemic activity
N'guessan *et al*., 2015 [12] reported the hypoglycemic activity of Ethyl Acetate Fraction Extract of *Holarrhena floribunda* leaves in Streptozotocin-Induced diabetic rats. The result showed significant hypoglycemic effect comparable to glibenclamide used as standard. Gnangoran *et al*., 2012 evaluated the hypoglycemic activity of ethanolic leaf extract and fractions of *Holarrhena floribunda* in normal fasted and fed-hyperglycemic rats. The dichloro-methane and ethyl acetate fractions of the plant showed significant hypoglycemic activity similar to Glibenclamide the standard drug [4].

7.5. Antioxidant activity
Badmus *et al*., 2010 [15] investigated the antioxidant potential of defatted methanol leave extract of *Holarrhena floribunda* using the 1,1 diphenyl-2-picrylhydrazyl (DPPH) radical, hydroxyl radical, nitric oxide radical scavenging and inhibition of lipid peroxidation methods. Total antioxidant activity was measured using phosphomolybdenum method. Total phenol content and the reductive potential of the extract were also evaluated. The results showed that the leaf extract has significant antioxidant activity.

7.6. Antimalarial activity
The in vivo antimalarial activity of *Holarrhena floribunda* leaf extract was reported. The experiment was performed in

mice using the 4-day suppressive test. The mice were inoculated by intra-peritoneal injection with red blood cells of donor mouse parasitized with *Plasmodium berghei.* The extract significantly suppressed ($P < 0.05$) the parasitaemia at all dose levels compared to the negative control group. *P. berghei* infected mice treated with extract showed a shorter survival time as compared to chloroquine treated infected mice [19].

7.7. Trypanocidal activity

Nnadi *et al*., 2017 [20] studied the activities of leaf and bark extracts of *Holarrhena floribunda* and their alkaloid fractions on *Trypanosoma brucei*. The extracts and their fractions showed significant in vitro activity against bloodstream forms of *T. brucei* rhodesiense.

7.8. Toxicity

Bogne *et al*., 2012 [21] investigated the Acute and sub-acute toxicity of the methanol extracts from *Holarrhena floribunda* G. Don. The result of the study showed that moderate intake of the plant extract up to 1g/kg has no toxic effect while high intake up to 2g/kg was toxic. According to Koudou *et al*., 2017 administration of *Holarrhena floribunda* in wistar rats did not result in functional disturbances or cardiac damage in rats [22]

8. Conclusion

The review of literature revealed the presence of many active phytochemical constituents which may be responsible for the various medicinal uses and pharmacological activities of *Holarrhena floribunda.* Further studies need to be carried out on Holarrhena floribunda in order to confirm its medicinal uses and also investigate other potential pharmacological activities. This plant can serve as source of bioactive molecules for future drug development.

9. References

1. Parvez Masud GM. Pharmacological Activities of Mango (*Mangifera indica*): A Review, Journal of Pharmacognosy and Phytochemistry 2016; 5(3):01-07 E-ISSN: 2278-4136
   P-ISSN: 2349-8234.
2. Kumar Suresh, Surender Paul, Yogesh Kumar Walia, Aditya Kumar, Parul Singhal. Therapeutic Potential of Medicinal Plants: A Review *, 2, 3, J. Biol. Chem. Chron., 2015; 1(1):46-54 ISSN (Print): 2454 – 7468 ISSN (Online): 2454 – 7476.
3. Jinous Asgarpanah, Fereshteh Ramezanloo. an overview on Phytopharmacology of Pelargonium graveolens, Indian Journal of Traditional Knowledge, 2015; 14(4):558-563.
4. Gnangoran BN, N'guessan BB, Amoateng P, Dosso K, Yapo AP, Ehile EE. Hypoglycaemic activity of ethanolic leaf extract and fractions of Holarrhena floribunda (Apocynaceae) Journal of Medical and Biomedical Sciences. 2012; 1(3):46-54.
5. Achille Yemoa, Joachim Gbenou, Dissou Affolabi, Mansourou Moudachirou, André. *et al*., Beninese Medicinal Plants as a Source of Antimycobacterial Agents: Bioguided Fractionation and *In Vitro* Activity of Alkaloids Isolated from *Holarrhena floribunda* Used in Traditional Treatment of Buruli Ulcer, Hindawi Publishing Corporation BioMed Research International Volume 2015. Article ID 835767, 5 pages http://dx.doi.org/10.1155/2015/835767
6. Tamboura HH, Bayala B, Lompo M, Guissou IP, Sawadogo L. Ecological Distribution, Morphological Characteristics And Acute Toxicity Of Aqueous Extracts Of *Holarrhena Floribunda* (G. Don) Durand & Schinz, *Leptadenia Hastata* (Pers.) Decne And *Cassia Sieberiana (D C)* Used By Veterinary Healers In Burkina Faso. *Afr. J. Traditional*, Complementary and Alternative Medicines www.africanethnomedicines.net ISSN 0189-6016. 2005.
7. De Kruif APM. A Revision Of Holarrhena R. Br.(Apocynaceae), Mededelingen Landbouwhogeschool Wageningen • Nederland. 1981, 81-2.
8. Iwu M. Maurice Hand Book of African Medicinal Plants Second Edition CRC Press Taylor And Frances Group 1993, 236. ISBN 9780849342660
9. Ruggiero M, Gordon D, Bailly N, Kirk P, Nicolson D. The Catalogue of Life Taxonomic Classification, Edition 2, Part A. In: Species 2000 & ITIS Catalogue of Life: 2011 Annual Checklist. 2011.
10. Orwa C, Mutua A, Kindt R, Jamnadass R, Anthony S. Agroforestree Database:a tree reference and selection guide version. 2009. 4.0 (http://www.worldagroforestry.org/sites/treedbs/treedatabases.asp)
11. Aniefiok Udobre, Udoh AE, Nwafor PA. Effect of The Methanol Root Extract Of Holarrhena Floribunda In Albino Mice, Indo American Journal of Pharmaceutical Research. 2014. Analgesic ISSN NO: 2231-6876
12. N'guessan Benoit Banga, Boua Narcisse Gnangoran, Joseph Adusei Sarkodie, Kassim Dosso *et al*., Alternative to Conventional Diabetic Management: The Antihyperglycaemic potential of an Ethyl Acetate Fraction Extract of *Holarrhena floribunda,* European Journal of Medicinal Plants. 2015; 8(4):175-189, Article no.Ejmp.2015.103 Issn: 2231-0894 Science domain International www.sciencedomain.org
13. Badmus JA, Ekpo OE, Hussein AA, Meyer M, Hiss DC. Antiproliferative and Apoptosis Induction Potential of the Methanolic Leaf Extract of *Holarrhena floribunda* (G. Don), Hindawi Publishing Corporation Evidence-Based Complementary and Alternative Medicine Volume Article ID 756482, 2015, 11. http://dx.doi.org/10.1155/2015/756482
14. Schmelzer GH. Holarrhena floribunda (G.Don) T.Durand & Schinz. In: Schmelzer, G.H. & Gurib-Fakim, A. (Editors). PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands. 2006.
15. Badmus Jelili A, Odunola, Oyeronke A, Obuotor, Efere M, Oyedapo Oyeboade O. Phytochemicals and in vitro antioxidant potentials of defatted methanolic extract of *Holarrhena floribunda* leaves, African Journal of Biotechnology. 2010; 9(3):340-346, Available online at http://www.academicjournals.org/AJB DOI: 10.5897/AJB09.734 ISSN 1684–5315 © 2010 Academic Journals.
16. Ali Loukaci., Oliver Kayser, Bindseil KU, Karsten Siems, Frevert J, Pedro Abreu M. New Trichothecenes Isolated from Holarrhena floribunda. Journal of Natural Products, 1999; 63(1):52-56. DOI: 10.1021/np990332l
17. Fotie J, Bohle DS, Leimanis ML, Georges E, Rukunga G, Nkengfack AE. Lupeol long-chain fatty acid esters with antimalarial activity from *Holarrhena floribunda*. J. Nat. Prod., 2006; 69(1):62-67.
18. Bogne Kamga Patrice, Penlap Beng Véronique, Lontsi

David, Etoa François-Xavier. Antibacterial Activities of The Extracts And Conessine From *Holarrhena Floribunda* G. Don (*Apocynaceae*),*Afr. J. Traditional*, Complementary And Alternative Medicines Www.Africanethnomedicines.Net. 2007.

19. Hoekou Patrick Yao, Tchadjobo Tchacondo1, Simplice Damintoti Karou1, Rakiswende Serge Yerbanga, Elom Achoribo; Ollo Da, Wouyo Atakpama *et al*. Therapeutic Potentials of Ethanolic Extract of Leaves of *Holarrhena Floribunda* (G. Don)Dur. and Schinz (Apocynaceae), Therapeutic Potentials of Ethanolic Extract of Leaves of *Holarrhena Floribunda* (G. Don) Dur. And Schinz (Apocynaceae) 2017.
20. Nnadi CO, Nwodo NJ, Kaiser M, Brun R, Schmidt TJ. Steroid Alkaloids from Holarrhena africana with Strong Activity against Trypanosoma brucei rhodesiense., Molecules. 2017; 22:1129.
21. Bogne KP, Penlap BV, Mbofung CM, Etoa FX. Acute And Subacute Toxicity Of The Methanol Extract From *Holarrhena Floribunda* G. Don (Apocynaceae). European Journal of Experimental Biology, 2012; 2(4):1284-1288.
22. Koudou DD, Tra-Bi Irie Otis, Oussou JB1, Kone Mama1, Yapo1 AP, Djaman AJ. Cardiac Tolerance of An Ethyl Acetate Extract of *Holarrhena floribunda* (G.Don) Durand and Schinz Leaves in Wistar Rats, Scholars Academic Journal of Pharmacy (SAJP) ISSN 2320-4206 (Online)Sch. Acad. J. Pharm. 2017; 6(6):229-235.