

Zanthoxylum zanthoxyloides

General description

Scientific Name

Zanthoxylum zanthoxyloides (Lam.) Zepern. & Timler

Vernacular Names

- rapeko (Moore)
- Guene gui deg (Wolof)
- Wo, Gozo ngua (Bambara)
- Barkeley, Bulabarkele (Peuhl)
- Fasahuari (Hausa)
- Dori (Toucouleur)
- wouho (Djoula)

Synonyms

Fagara zanthoxyloides Lam, *Zanthoxylum senegalense* DC..

Family

Rubiaceae

Botanical Description (Nacoulma, 1996; Arbonier, 2004)

Shrub or small tree, spiny and more or less scandent, up to 6–8(–12) m tall, with straight, often short bole and rounded and quite dense crown; bark grey to beige, rough, with fine vertical fissures, often with woody prickle-bearing protuberances; slash yellow, odorous, orange-mottled beneath; stems glabrous, grey, with solitary prickles. **Leaves** alternate, glabrous, imparipinnately compound with 5–7(–11) opposite or alternate leaflets, up to 12(–20) cm long; petiole 2–5 cm long, glabrous, spiny beneath with recurved prickles; stipules absent; petiolules 2–5 mm long; leaflets obovate to elliptical, 5–10 cm × 2–4 cm, base cuneate to rounded, apex obtuse or rounded, sometimes apiculate or notched, with many glandular dots, smelling of pepper and lemon when crushed, rigidly papery, pinnately veined with 10–14 pairs of lateral veins, barely prominent, fusing near the margin. **Inflorescence** a lax terminal or axillary panicle 5–25 cm long, with short branches. **Flowers** unisexual, regular, 5-merous, white or greenish, sessile; corolla barely open; male flowers with stamens slightly

exserted; female flower with superior ovary, 1-celled, style short, lateral. **Fruit** an ovoid follicle, 5–6 mm in diameter, brown, with glandular dots, dehiscent, 1-seeded. Seed black to bluish, shiny, long persistent in the fruit.



Tree



Stem



fruits and leaves

Plant Part Used

Throughout West Africa the aromatic roots, stem bark and leaves are commonly used in traditional medicine.



Roots

Leaves

Possible Alternative Source Species

In vitro propagation of *Zanthoxylum anthoxyloides* Lam., an endangered African medicinal plant was proven (Etsè et al. 2011).

Ethnobotanical information

Major Ethnopharmacological Uses

They are considered antiseptic, analgesic and diaphoretic. Root or stem bark macerations, decoctions or infusions are widely taken to treat malaria, fever, sickle cell anaemia, tuberculosis, paralysis, oedema and general body weakness. They are also widely taken to treat intestinal problems, including colic, dysentery, intestinal worms, gonorrhoea and

urethritis, but also as an emmenagogue, stimulant and to treat pain during childbirth, migraine and neuralgia. The roots are externally applied to ulcers, swellings, haemorrhoids, abscesses, snake bites, yaws, wounds leprosy and syphilitic sores as well as rheumatic and arthritic pain and hernia (Nacoulma, 1996).

The roots and stem bark give a warm, pungent and benumbing effect on the palate when chewed, and are widely used in the treatment of sore gums, toothache and dental caries. A decoction of the roots is used as a mouthwash and against a sore throat.

In Côte d'Ivoire sap from the pulped bark is applied as eye drops to treat eye infections, notably conjunctivitis with pus. In Ghana root and stem bark powder is taken to treat whooping cough (Arbonnier, 2004).

In southern Nigeria a decoction of the stem bark and roots is taken to treat cancer. Pulped stem bark and root bark is thrown in the water to stupefy fish.

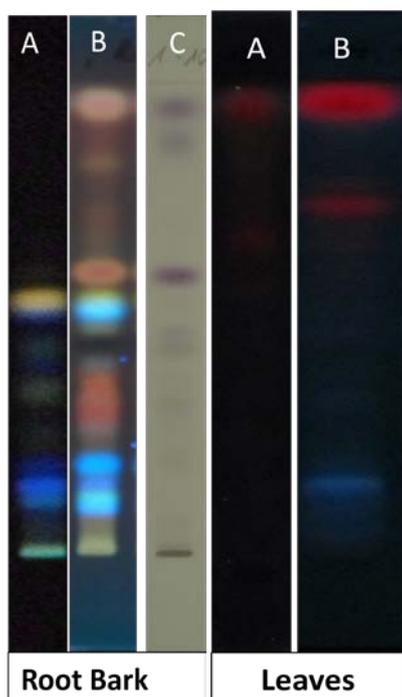
In West Africa, it is planted as a hedge, as the thorns make it impenetrable. Sheep browse the leaves. The wood is used for manufacturing of torches. The timber is yellow, very hard and termite-resistant and used for building purposes, including poles and posts. It also makes good firewood. The roots, young shoots and twigs are commonly used as chew-sticks. The bark or young branches contain much resin, which makes them suitable for ceremonial torches. The spines are thrown into fire to give off a scented smoke. The leaves, which smell like citronella, and the seeds, which taste strongly of cinnamon or pepper, are commonly used to season food. From the seeds, necklaces are made. *Z. zanthoxyloides* also has numerous magico-religious uses, including protection against spirits. It also serves as fetish plant (Arbonnier, 2004).

Chemical constituents

Fruits:

- ✓ α -pinene, trans- β -ocimene, citronellol, citronellyl acetate, the α -terpinolene, the α -phellandrene, geraniol, limonene and the β -myrcene (Ngassoum et al. 2003).
- ✓ acridone alkaloids, namely, 3-hydroxy-1,5,6-trimethoxy-9-acridone; 1,6-dihydroxy-3-methoxy-9-acridone; 3,4,5,7-tetrahydroxy-1-methoxy-10-methyl-9-acridone; 4-methoxyzanthacridone; 4-hydroxyzanthacridone; 4-hydroxyzanthacridone oxide. The known acridones which have been characterized are, hebelicine A; 1-hydroxy-3-methoxy-10-methyl-9-acridone; 1,3-dihydroxy-4-methoxy-10-methyl-9-acridone and tegerrardin A (Wouatsa et al. 2013).

TLC / HPLC / GC



Root Bark acetone extract

A: 365 nm, B: Anisaldehyde under

UV 365nm, C: Anisaldehyde

Markers and Quantitative

Methods

Adulterants and Adulterations

Fagara zanthoxyloides Lam;

Zanthoxylum senegalense

Standard Preparations: decoction,
maceration

Antioxidant activity

Stem extract demonstrated the DPPH radicals scavenging and chelating iron and reduced generation of reactive oxygen species in isolated mitochondria in the presence or absence of hydrogen peroxide (Adekunle et al. 2012).

Pharmacological properties

Pharmacodynamic Properties

In Vitro Experiments

Antimicrobial activity

The antibacterial and antifungal activities of fruit essential oil; leave and roots bark were demonstrated (Anne et al. 2013, Misra et al. 2013, Ngane et al. 2000,).

Antiparasitic activity

Roots extracts were found to be significantly active against the intracellular form of *Leishmania major* parasite (Maximin et al. 2007); while leaves extract has presented lowest anthelmintic activities on *Ascaris lumbricoides* (Barnabas et al. 2011). The non polar fractions from crude alkaloid was displayed a good antiplasmodial (W2) with a IC_{50} ranging 1.91 to 4.32 $\mu\text{g/ml}$ (Gansane et al. 2010). The reverse-phase high-pressure liquid chromatography (RP-HPLC)-semipurified, and RP-HPLC-purified root extracts inhibit the growth of *P. falciparum* (3D7) in vitro, with 50% inhibitory concentrations (IC_{50} s) of 4.90, 1.00, and 0.13g/ml, respectively (Kassim et al. 2005).

The oils were also tested for antiproliferative, antimicrobial and antioxidant activities by MTT assay, agar disc diffusion method, and DPPH, ABTS and β -carotene–linoleic acid assay, respectively (Fogang et al. 2012).

In Vivo Experiments

Fresh leaves and stem bark extracts (200mg/kg bw and 500mg/kg bw, p.o) caused significant reduction in the concentrations of serum total cholesterol, triacylglycerol and LDL-cholesterol, with a significant increase in HDL-cholesterol concentration in rats administered (Oyewole et al. 2012). Leaves extract though exhibits antidiabetic and hypolipidaemic effects, in alloxan induced diabetic rats (Aloke et al. 2012).

The ethanolic root bark extract (150mg/kg to 500 mg/kg, p.o.) has gastroprotective effect in Sprague-Dawley rats working possibly via antimuscarinic or antihistaminic mechanism(Boye et al. 2012). The leaves powder (3.2 g/kg to 4.8 g/kg p.o.) demonstrated a moderate antihelmintic effect (Azando et al. 2011).

Leaves extract exhibited antidiabetic and hypolipidaemic effects Aloke et al 2012. The hypotensive of root bark extract was evaluated (Zahoui et al. 2010). The extract reduced vasodilatation and decreased capillary permeability in inflammation (Prempeh, et al. 2009).

Clinical Studies: none

Pharmacokinetic Properties: none

Safety data

Ethnic Use Safety Data

Root bark and leaves extract have been used for many years with no side effects.

Preclinical Safety Data: none

Single Dose Toxicity: none

Repeated Dose Toxicity

The LD50 of the methanolic root extract was found to be 5.0 g/Kg body weight within 95 % confidence limits, with congestion and focal necrosis of the liver and renal tubules in mice (Ogwal-okeng et al. 2003). Toxicological Evaluation of Methanolic Stem Bark extract suggests that the margin of safety of the extract is high at a dose of 1.5 mg/kg bw in Wistar rats (Nwozo et al. 2011).

Mutagenic Potential: none

Carcinogenicity; none

Sensitizing Potential: none

Clinical Safety Data: none

Key (proposed) usage

Therapeutic Indications: malaria, drepanocytose, headache; stomachache

Dosage Method and Duration of Administration: until healing

Contraindications Special Warnings and Precautions for Use:none

Effects on Ability to Drive and Use Machines: none

Interactions: none

Pregnancy and Lactation : none

Adverse Effects: Vomiting

Overdose: Vomiting

Evaluation of Efficacy: antimalarial pharmacological proven(Gansane et al. 2010).

Trade information

Volume of production in the country: lack of information

Volume of domestic consumption: lack of information

Volume of export : lack of information

Average price : lack of information

Nature of plant material: everytime

Conservation status: vulnerable

Nature of plant products: lack of information

Processing and Storage: leaves, root bark, dry in shade or sun, store in plastic

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