

Mutamba

Guazuma ulmifolia

Monograph 4/1/04

Family: Sterculiaceae/Malvaceae

Synonyms: *Bubroma grandiflorum*, *B. guazuma*, *B. invira*, *B. polybotryum*, *B. tomentosum*, *Diuroglossum rufescens*, *Theobroma guazuma*, *T. tomentosa*, *Guazuma blumei*, *G. bubroma*, *G. coriacea*, *G. grandiflora*, *G. guazuma*, *G. inuira*, *G. invira*, *G. parviflora*, *G. polybotra*, *G. tomentosa*, *G. utilis*

Standard Common Name: Bastard Cedar (Herbs of Commerce, 2nd edition)

Other Common Name: West Indian Elm (Herbs of Commerce, 2nd edition)

Additional Common Names:

Ajya, aquiche, atadijo, bay cedar, bois de hetre, bois d'orme, bois d'homme, bolaina, cabeza de negro, cambá-aca, caulote, cimarrona, embira, embiru, guacima, guacimo, guasima de caballo, guasima, guazima, guazuma, ibixuma, mutambo, orme d'amerique

Overview

Botanical Description

Mutamba is a medium-sized tree that grows up to 20 m high, with a trunk 30 to 60 cm in diameter. Its oblong leaves are 6 to 12 cm long, and it produces small flowers that are white-to-light-yellow in color. It also produces an edible fruit that is covered with rough barbs and has a strong honey scent. Mutamba is indigenous to tropical America on both continents and found throughout the Amazon rainforest.

Ethnobotanical Uses

The bark and leaves have been traditionally used by herbal medicine practitioners for their following properties: antibacterial, antidiarrheal, antifungal, anti-inflammatory, antimicrobial, astringent, depurative, diaphoretic, emollient, febrifuge, hepatoprotective, pectoral, refrigerant, stomachic, styptic, sudorific and vulnerary.¹

The traditional use of mutamba have been recorded in herbal medicine systems in the following countries: Belize,² Brazil,³⁻⁴ Colombia,⁵⁻⁶ Cuba,⁷ Dominican Republic,⁸ Guatemala,⁹⁻¹² Haiti,^{13,14} Jamaica,¹⁵⁻¹⁸ Mexico,¹⁹⁻²⁴ Panama,²⁵ and Peru.²⁶⁻²⁸

Summary of Traditional Uses of Mutamba:¹

Bark: Alopecia, asthma, bronchitis, bruises, burns, childbirth, constipation, coughs, dermatitis, dermatitis, diarrhea, dysentery, elephantiasis, fevers, fractures, gastrointestinal pain, gonorrhea, grippe, hemorrhage, hemorrhoids, hypertension, infections, influenza, kidney problems, leprosy, liver problems, malaria, nephritis, pneumonia, prostate problems, pulmonosis, skin conditions, stomach inflammation, stomachache, syphilis, ulcers, uterine pain, wounds.

Fruit: Diarrhea, hemorrhage, infection, uterine pain.

Leaves: Alopecia, asthma, bruises, dermatitis, dysentery, erysipelas, fevers, inflammation, kidney diseases, liver diseases, skin eruptions, skin diseases, sores, ulcers, wounds.

Root: Childbirth.

Stembark: Diarrhea.

Primary Uses in Traditional Herbal Medicine Systems

Internal

Mutamba is a favorite natural remedy among Central and South American health practitioners and the indigenous peoples of the Amazon, often turned to first for upper respiratory infections as it can quiet coughs, reduce fever, as well as provide antiviral and antibacterial action.²⁹

External

The bark and leaves have traditionally been used for alopecia.³⁰ Clinical and laboratory research has validated this traditional use.³¹⁻³⁵

Chemistry

Mutamba bark is rich in tannins and proanthocyanidins. The main plant phytochemicals that have been found in various sections of the mutamba plant thus far include: alkaloids, caffeine, caryophyllene, catechins, epicatechins, farnesol, friedelin, kaurenoic acid, precocene I, procyanidin B-2, procyanidin B-5, procyanidin C-1, sitosterol, terpenes.¹

Various chemicals in mutamba have been documented with the following biological activities:

Internal

Antitumor Activity

Procyanidin B-2 has shown *in vitro* antitumor activity.^{36,37} In one study it showed activity towards melanoma cells PRMI-7951 with an ED50 of 1-4 mcg/ml. No activity was seen towards lung carcinoma, ileocecal adenocarcinoma, epidermoid carcinoma of the nasopharynx and medulloblastoma.³⁷

Neurological Activity

Procyanidin B-2 at 100-300 mM protected cultured cerebellar granule cells from glutamate-induced neuronal death through the inhibition of calcium influx.³⁸

Cardiovascular Activity

In rats, intravenous procyanidin B-2 lowered blood pressure through a decrease of sympathetic tone and direct vasodilation.³⁹

Antiviral Activity

Procyanidin C-1 inhibited herpes simplex virus type 1 *in vitro*.⁴⁰

Antioxidant Activity

Procyanidin C-1 demonstrated antioxidant activity in lipid peroxidation and hydroxyl radical scavenging assays.⁴⁰

External

Hair Growth Promoter

In vivo studies in male humans using 1% procyanidin B-2 extract resulted in a 78.9% increase in hair diameter and in increase in the number of total hairs.^{32,33} In mice procyanidin B-2 promoted hair growth by 300%.³⁵ Procyanidin C-1 in mice had a growth promoting effect of 220%.³⁵ In other studies topical application of 1% procyanidin on shaven mice in the telogen phase led to hair regeneration - procyanidin B-2 increased regeneration by 69.6% and procyanidin C-1 by 78.3%.^{34,35} Several *in vitro* studies have also demonstrated the hair growing effect of procyanidin B-2 and C-1.^{31,34} Procyanidin B-2 and C-1 down regulates protein kinase C isoenzymes (-alpha, -beta1, -beta2, -beta3) in hair cells, promoting hair cell growth.^{31,34}

***In vivo* and *In vitro* Research and Pharmacological Actions**

Cardiovascular Activity

- An alcoholic and water extract of the bark had weak cardiac depressant activity on insect hearts.⁴¹
- An alcoholic extract of the bark had cardiostimulant activity on insect hearts.⁴¹

- A water bark extract demonstrated hypotensive activity when given intravenously to cats. An alcoholic extract was inactive.⁴¹
- Bark acetone extracts of 10 mcg/ml inhibited the binding of angiotensin II to receptor cells by more than 50% in an *in vitro* study.²⁵

Antihyperglycemic Activity

A decoction of the mutamba leaf given intragastrically to rabbits at 4 mg/kg reduced glucose-induced hyperglycemia; decreasing the hyperglycemic peak and the area under the glucose tolerance curve.¹⁴

Antimicrobial Activity

Antifungal

In *in vitro* studies ethanol extracts of the fruit and bark, between 10 - 25 mcg, demonstrated activity against *Cladosporium cucumerinum* and *Penicillium oxalicum*.²⁰

Antiviral

A methanol leaf extract at 100 mcg/ml demonstrated *in vitro* weak antiviral activity against the herpes simplex 1 virus.⁴²

Antibacterial

Leaf, bark and fruit extracts have demonstrated antibacterial activity at a range of concentrations, from 10 mcg - 50 mg or 10 ml - 50 ml. Bacteria the extracts have shown activity against include: *S. aureus*, *B. cereus*, *B. subtilis*, *M. luteus*, *N. gonorrhoea*, *E. coli*, *P. aeruginosa*, *S. dysenteriae*, *S. typhosa*, *S. pneumoniae* and *S. pyogenes*.^{9,12,20,43-46} Ethanol extracts demonstrated the greatest activity.^{12,20}

Molluscicidal Activity

At 1000 ppm ethanol and water extracts of the trunkbark demonstrated weak activity *in vitro* against *Biomphalaria glabrata* and *B. straminea*.⁴⁷

Smooth Muscle Relaxant

Bark ethanol and water extracts have demonstrated smooth muscle relaxant activity in the guinea pig and rabbit small intestine.⁴¹

Antisecretory Activity

Ethanol extracts of the stem bark at 40 mcg/ml had an antisecretory effect in the rabbit colon, inhibiting cholera toxin-induced secretion.^{23,24}

Cytotoxic Activity

In one *in vitro* study an ethanol extract of the leaf exhibited strong activity against human oral epidermoid carcinoma cells (Ca-9kb), inhibiting growth by 97.3%.⁴⁸

Anti-inflammatory Activity

- An ethanol bark extract demonstrated anti-inflammatory activity in the *in vitro* HET-CAM assay.⁴⁹
- An ethanol-water leaf extract at 750 mcg/ml *in vitro* inhibited prostaglandin synthetase by 61.8%.⁵⁰

Antioxidant Activity

Mutamba aqueous extracts demonstrated *in vitro* antioxidant activity, being able to scavenge DPPH and OH⁻.⁵¹

Uterine Stimulant Activity

Mutamba bark ethanol and water extracts have demonstrated uterine stimulant activity in non-pregnant and pregnant animal (rat) studies.^{41,51}

Patents Filed / Pending

A US Patent was filed in 2003 on a hair growing agent containing a proanthocyanidin of one or more of the following: procyanidin B-1, procyanidin B-2, procyanidin B-3, procyanidin C-1 and procyanidin C-2. An *in vitro* study was cited in which procyanidin B-2 at 30 $\mu\text{mol/l}$ had a relative cell growth rate of 310 on cultured mouse hair follicle cells (control 100).⁵²

Mechanism of Action

Cardiovascular Activity

Hypotensive activity may be due to the ability of bark extracts to inhibit the binding of angiotensin II to the AT1 receptor.^{53,54} Binding has been inhibited by as much as 50%.⁵⁴ This activity is thought to be due to the proanthocyanidins containing epicatechin units.⁵³ In addition the compound procyanidin B-2 has been documented with blood pressure lowering activity through a decrease of sympathetic tone and direct vasodilatation.³⁹

Antisecretory Activity

The bark of mutamba has significant antisecretory activity in dysentery. It is able to completely inhibit cholera toxin-induced chloride secretion if delivered before administration of the cholera toxin. Mutamba directly interacts with the A subunit of the cholera toxin, rendering it inactive. This activity is attributed to the procyanidins.⁵⁵

Cytotoxic Activity

The cytotoxic activity of mutamba is attributed to the procyanidins, in particular procyanidin B-2 and procyanidin C-1.³⁷

Antioxidant Activity

Mutamba aqueous extracts have antioxidant activity, being able to scavenge DPPH and OH.⁵¹ This activity may be due to its procyanidin content. Procyanidin C-1 has shown the highest antioxidant activity, inhibiting lipid peroxidation and hydroxyl radicals.⁴⁰

Hair Growth Promoter

The procyanidins in mutamba are thought to promote hair growth. This hair-growing activity of certain procyanidins is attributed to their ability to inhibit protein kinase C. Procyanidin B-2 and procyanidin C-1 are able to selectively inhibit protein kinase C. *In vitro* this results in hair epithelial cell proliferation, and anagen induction *in vivo*.^{31,34}

Dosage

Internal

Crude Preparations, Bark

1 - 2 grams of bark powder daily

Decoction: 1 cup 2-3 times daily

Tincture: 2 - 3 ml twice daily of a 4:1 tincture

External

Crude Preparations, Bark

Decoction applied topically 3-4 times weekly

Duration of Administration

Internal

Duration of administration varies per complaint and individual. Literature does not report any adverse effects with long-term use.

External

Literature does not report any adverse effects with long-term external use.

Contraindications

Pregnancy and Lactation: Mutamba bark has been documented with uterine stimulant activity in animal (rat) studies and should not be used during pregnancy.^{41,51} It is not known if chemicals are passed through breast milk, or their effect, therefore it is advised that ingestion of mutamba be avoided during lactation.

Mutamba leaves contain a small amount (0.14%) of naturally-occurring caffeine. Those sensitive to or allergic to caffeine should not use mutamba leaves (mutamba bark has not been documented to contain caffeine).⁵⁶

Drug Interactions

May potentiate hypotensive medications.⁴¹

May potentiate hypoglycemic medications.¹⁴

Side Effects

None reported in the literature.

Safety Rating

Not rated.

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