

Technical Data Report

for

Tamamuri (**Brosimum acutifolium**)



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Tamamuri

Family: Moraceae

Taxon: *Brosimum acutifolium* Huber

Synonyms: *Brosimopsis acutifolia* (Huber) Ducke., *Brosimum acutifolium* spp. obovatum Ducke., *Brosimopsis obovata* Ducke., *Brosimum caniceps* Standl., *Piratinera acutifolia* (Huber) Pittier

Common names: ahua jonra, amapá doce, bois mondan, bururé, congona, leche-caspi, manichi, mercurio-vegetal, mercurio vegetal, mercurio-da-terra-firma, morure, muira-piranga, murare, mururé, murure-da-terra-firma, murure-vermelho, mururi, quecho, takini, takweni, tamamuri, tauni, urupi, vegetable mercury

Part Used: Bark

Herbal Properties & Actions		
Main Actions:	Other Actions:	Standard Dosage: Bark
eases arthritis	increases libido	Tincture: 2 ml 3 times daily
reduces inflammation	expels worms	Decoction: 1 cup 3 times daily
relieves pain	kills cancer cells	Capsules: 1 g 3 times daily
kills fungi & yeast	kills leukemia cells	
kills bacteria		
cleanses blood		
prevents ulcers		
overall tonic		

Tamamuri is a large canopy tree of the Amazon rainforest that grows 15 to 25 m high. It produces a white to light pink latex when the smooth trunk bark is wounded or the leaf stems are broken from the branches. It has oblong veined leaves about 8 to 15 cm long by 4-5 cm wide. Tamamuri is found throughout the lower elevations of the Amazon basin, usually growing alongside streams and rivers where its fruits (similar to a fig but with one large seed inside) are eaten by fish when it falls from the tree.

Tamamuri is in the Mulberry family and the *Brosimum* genus includes approximately 50 species of tropical and warm-temperate trees in South America.

TRIBAL AND HERBAL MEDICINE USES

The Shipibo-Conibo Indians on the Ucayali River in the Peruvian Amazon have a legend about tamamuri. They believe that when a man ingests the white latex of the tamamuri tree that he will father light-skinned male children. They also use the bark medicinally (in decoctions) for gastrointestinal disorders, to purify the blood and to regulate the nervous system. The Wayãpi Indians in Guyana also attribute magical properties to the tree. They believe the latex of the tree will help protect them from witchcraft and bad spells. They also prepare a decoction of the roots to treat headaches and to improve memory and put the bark in baths to treat fevers.

Tamamuri is a very common and well-respected remedy for rheumatism and arthritis throughout the Amazon and in traditional medicine systems in South America. It is also a very common remedy for syphilis, which is how it earned one of its common names, "vegetable mercury." Mercury was the leading treatment for syphilis in the late 1800s and early 1900s. . . and before we knew any better!

In herbal medicine systems in Peru, tamamuri is considered a pain-reliever, anti-inflammatory, blood cleanser, aphrodisiac and tonic. It is used for arthritis and rheumatism (including rheumatoid arthritis), muscle pain and injuries, for intestinal worms, anemia, vertigo and loss of balance, to help regulate the nervous system, as a general tonic for debility, for fungal and yeast infections, gastric ulcers and gastrointestinal disorders, as well as for syphilis.

In Brazilian herbal medicine the tree is called *mururé* and it is widely used for arthritis, rheumatism and syphilis, as well as for gastric ulcers and skin ulcers, and as an aphrodisiac and tonic.

PLANT CHEMICALS

Tamamuri bark contains flavans, flavanoids, lignans, phenylpropanoids, benzoids, and steroids.¹⁻⁶ Many of these chemicals are novel ones never before seen by scientists, including 6 chemicals they've named *acutifolins* and 13 chemicals they've named *brosimacutins*.

Chemicals identified in tamamuri bark thus far include: acutifolins A thru F, brosimacutins A- M, brosimine A & B, (-) 5-o-beta-d-xylopyranoside epi-catechin, (-) epi-catechin, (-) liquiritigenin, (-) naringenin, 3'-7-dihydroxy-4'-methoxy-flavan, 4'-hydroxy-7-8-(2''-2''-dimethyl-pyranflavan), 4'-7-dihydroxy-flavan, 4'-7-dihydroxy-8-prenylflavan, 4'-hydroxy-7-8-(3''-hydroxy-2''-2''-dimethyl-pyranflavan), beta-sitosterol, coniferaldehyde, dihydroconiferyl, hydroxyonchocarpin, icariside E-3 aglycone, iso-hydroxycordoin, iso-bavachin, iso-lariciresinol, iso-liquiritigenin, liquiritigenin, luteolin, mururin A thru C, protocatechuic acid, stigmaterol, and syringaldehyde.

BIOLOGICAL ACTIVITIES AND CLINICAL RESEARCH

Tamamuri's long-standing use for arthritis and rheumatism has been the subject of research by Western scientists. In 2003, Brazilian researchers reported that crude extracts of tamamuri bark reduced inflammation induced by various means in laboratory rats.⁷ Other researchers have reported that two chemicals in tamamuri (mururin A and B) have the ability to inhibit protein kinase C (PKC) and protein kinase A (PKA).⁸ PKC is involved with various conditions and is one of the chemicals that the body uses to actually produce inflammation. People with autoimmune disorders, arthritis, and rheumatoid arthritis usually have elevated PKC levels, and PKC inhibitors are a new class of drugs under research for these types of conditions.⁹

In addition to autoimmune disorders and arthritis, PKC, as well as PKA, is also thought to play a role in cancer and tumor cell growth.^{10,11} Tamamuri's ability to inhibit PKC and PKA might be the reason behind its documented actions against cancer cells. Researchers have reported that a crude extract of tamamuri bark was cytotoxic to human colon and lung cancer cell lines *in vitro*¹² as well as toxic to a leukemia cell line (including a drug-resistant leukemic cell line).¹³ However, one of these research groups attributed the cytotoxic action, not to the PKC-inhibitor mururin chemicals, but to the newly discovered brosimacutin chemicals.¹³ They have yet to report the mechanism by which these new chemicals can kill cancer cells.

While scientists have yet to test tamamuri specifically against syphilis, researchers at Cornell University reported that tamamuri bark showed *in vitro* antibacterial actions against other common bacteria—*Bacillus* and *Staphylococcus*.¹⁴ This same study reported that it was also active against *Helicobacter pylori* (the bacteria that is the cause of stomach ulcers) as well as *Candida albicans* which confirms two other traditional uses of the bark: for gastric ulcers and yeast infections.¹⁴ They also reported that it was active against a common strain of skin fungus.¹⁵

Toxicity studies with rats conducted in Brazil indicate that tamamuri is non-toxic and without any demonstrable negative side effects.¹⁵

CURRENT PRACTICAL USES

While American consumers have heard little about tamamuri yet, it remains a very popular remedy in Brazil and Peru for rheumatism and arthritis. It can be found in most of the South American medicinal plant markets, natural product stores and pharmacies. Only one or two tamamuri products are available in the U.S. natural products market today, but demand is likely to increase as more people learn about this wonderful rainforest tree and its many effective uses.

TAMAMURI PLANT SUMMARY	
Main Actions (in order): anti-arthritic, anti-inflammatory, analgesic, antisyphilitic, anticandidal	
Main Uses: 1. for arthritis, rheumatism and rheumatoid arthritis 2. for general pain and inflammation (i.e.; muscle pain, injuries, headaches, etc.) 3. for syphilis 4. for yeast infections (candida) and skin fungi 5. for gastric ulcers (<i>H. pylori</i>) and other gastrointestinal problems	
Properties/Actions Documented by Research: antibacterial, anti-candidal, antifungal, anti-inflammatory, antitumor, cytotoxic, PKA inhibitor, PKC inhibitor	
Properties/Actions Documented by Traditional Use: analgesic, anthelmintic, anti-anemic, anti-inflammatory, anti-leukemic, anti-rheumatic, anti-syphilitic, aphrodisiac, appetite stimulant, depurative, tonic, and vermifuge	
Cautions: None reported.	

Traditional Preparation: Tamamuri bark is traditionally prepared in decoctions and tinctures.

Contraindications: None reported.

Drug Interactions: None reported.

WORLDWIDE ETHNOMEDICAL USES	
Amazonia	for arthritis and rheumatism
Brazil	as an analgesic, anti-inflammatory, anti-rheumatic, aphrodisiac, depurative, and tonic; for arthritis, childbirth pain, gastric ulcers, menstrual pain, muscle pain, rheumatoid arthritis, rheumatism, skin ulcers, and syphilis
Colombia	as a anti-asthmatic, digestive, laxative, and tonic
Guyana	for fever, headaches, magic, muscle pains, and poor memory
Peru	as an analgesic, anthelmintic, anti-anemic, anti-inflammatory, anti-rheumatic, anti-syphilitic, aphrodisiac, appetite stimulant, depurative, tonic, and vermifuge; for anemia, arthritis, diabetes, debility, fever, fungal infections, gastrointestinal disorders, headaches, muscle pain, nervous system regulation, rheumatoid arthritis, rheumatism, syphilis, vertigo, yeast infections

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16. Dos Santos, M. C., et al. "Avaliação da toxicidade do extrato hidro-alcoólico e das frações isoladas de *Brosimum acutifolium* no tratamento da artrite induzida por adjuvante completo de freund em ratos Lewis." *Proceedings of the XV Congresso de Iniciação Científica da UFAM*. Brazil. Aug. 2003; page 222.

Ethnomedical Information on Tamamuri (*Brosimum acutifolium*)

Part / Location	Documented Ethnomedical Uses	Type Extract / Route	Used For	Ref #
Bark - Amazon	Used for rheumatism.	Not stated	Human Adult	BA2002
Bark - Brazil	Used as an antirheumatic.	Not stated	Human Adult	T08730
Bark - Brazil	Used for rheumatism.	Infusion / Oral	Human Adult	K16654
Bark - Brazil	Used as an anti-inflammatory; for rheumatism and arthritis.	Infusion / Oral	Human Adult	H18995
Bark - Brazil	Used as an aphrodisiac and tonic; for rheumatism.	Not stated	Human Adult	ZZ2010
Bark - Brazil	Used as an antirheumatic, depurative; for arthritis, rheumatism, muscular pain, gastric ulcers, syphilis, and skin ulcers.	Tincture / Oral Decoction / Oral	Human Adult	ZZ1007
Bark - Brazil	Used in baths and washes for rheumatism and skin ulcers.	Decoction / External	Human Adult	ZZ1007
Bark - Brazil	Tikuna Indians use it to lessen menstrual pain and childbirth pain.	Decoction / Oral	Human Adult	ZZ1005
Bark - Colombia	Used as a digestive, tonic, laxative, and anti-asthmatic.	Not stated	Human Adult	ZZ2007
Bark - Guyana	Used in baths against fever.	Bark / Bath	Human Adult	L04137 ZZ1033
Bark - Peru	Used as a aphrodisiac, anti-anemic, depurative, anti-inflammatory, anti-rheumatic, anti-syphilitic and recommended for rheumatoid arthritis, diabetes, debility, syphilis, anemia, and loss of balance (falling down).	Decoction / Internal	Human Adult	ZZ2013
Bark - Peru	Shipibo-Conibo take it for gastrointestinal disorders, to purify the blood, and regulate the nervous system .	Decoction / Oral	Human Adult	ZZ2003
Bark - Peru	Used for rheumatism and arthritis. Used for debility. Used for muscle pain and rheumatism.	Tincture / Oral Decoction / Oral Tincture / External	Human Adult	ZZ1008
Bark - Peru	Used as a anthelmintic, aphrodisiac, depurative, and tonic ; for arthritis, syphilis, and rheumatism.	Not stated	Human Adult	ZZ1105
Bark - Peru	Used for yeast infections.	Decoction / Oral	Human Adult	BA2001

Part / Location	Documented Ethnomedical Uses	Type Extract / Route	Used For	Ref #
Bark - Peru	Used as a depurative and aphrodisiac; for debility.	Decoction / Oral	Human Adult	ZZ1101
Bark - Peru	Used for headaches and rheumatism.	Tincture / Oral	Human Adult	L04137 ZZ1027
Bark - Peru	Used for rheumatism.	Tincture / Oral	Human Adult	ZZ1101
Bark - Peru	Used as a depurative, tonic, vermifuge: to stimulate the appetite, for rheumatism and syphilis.	Not stated / Oral	Human Adult	L04137 ZZ1041
Bark - Peru	Used in baths against fever.	Decoction / External	Human Adult	ZZ2011 ZZ1101
Bark - Peru	Considered an aphrodisiac. Used for debility. Used for rheumatism.	Decoction / Oral Tincture / Oral	Human Adult	ZZ2011
Bark + Latex - Peru	Used for syphilis.	Decoction / Oral	Human Adult	ZZ2011 ZZ1101
Bark + Latex - Peru	Used for arthritis and rheumatism.	Decoction / Oral	Human Adult	ZZ1101
Latex - Brazil	Latex considered a depurative but toxic in large doses.	Latex / Oral	Human Adult	ZZ1099
Latex - Guyana	The Palikur and Wayāpi inhale the dried latex as a hallucinogen in ritual initiations. Wayāpi use it to protect against bad spells and witchcraft.	Latex / Nasal	Human Adult	L04137 ZZ1033 ZZ1104
Latex - Guyana	Sometimes added to ayahuasca. Used for muscle pains.	Latex / Adjunctive Latex / External	Human Adult	ZZ1033
Latex - Peru	Used as an anthelmintic and anti-syphilitic.	Latex / Oral	Human Adult	ZZ2013
Latex - Peru	Shipibo-Conibo believe that a man who ingests the white latex will affect his semen to produce light-skinned male children.	Latex / Oral	Human Adult	ZZ2003
Latex - Peru	Ingested in small amounts for rheumatism and as a tonic.	Latex / Oral	Human Adult	ZZ2007
Latex - Peru	Used as an anthelmintic.	Latex / Oral	Human Adult	ZZ1101
Root - Brazil	Used as an antirheumatic.	Not stated	Human Adult	T08730
Root - Guyana	Used for headaches and poor memory.	Decoction / Oral	Human Adult	ZZ1033

Presence of Compounds in Tamamuri (*Brosimum acutifolium*)

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Acutifolin A	Flavonoid	Bark	Brazil	00.001%	H28814
Acutifolin B	Flavonoid	Bark	Brazil	00.000087%	H28814
Acutifolin C	Flavonoid	Bark	Brazil	00.000187%	H28814
Acutifolin D	Flavonoid	Bark	Brazil	00.0297%	H28814
Acutifolin E	Flavonoid	Bark	Brazil	00.0016%	H28814
Acutifolin F	Flavonoid	Bark	Brazil	00.00013%	H28814
Bavachin, iso:	Flavanone	Trunk Bark	Brazil	00.00052%	H25999
Brosimacutin A	Flavanone	Bark	Brazil	00.0017%	H30830
Brosimacutin B	Flavanone	Bark	Brazil	00.0012%	H30830
Brosimacutin C	Flavanone	Bark	Brazil	00.000073%	H30830
Brosimacutin D	Flavanone	Bark	Brazil	00.00014%	H30830
Brosimacutin E	Flavanone	Bark	Brazil	00.00031%	H30830
Brosimacutin F	Flavanone	Bark	Brazil	00.00017%	H30830
Brosimacutin G	Flavonoid	Bark	Brazil	00.0001%	H30830
Brosimacutin H	Flavonoid	Bark	Brazil	00.00055%	H30830
Brosimacutin I	Flavonoid	Bark	Brazil	00.00049%	H30830
Brosimacutin J	Flavonoid	Bark	Brazil	Not stated	BA2003
Brosimacutin K	Flavonoid	Bark	Brazil	Not stated	BA2003
Brosimacutin L	Flavonoid	Bark	Brazil	Not stated	BA2003

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Brosimacutin M	Flavonoid	Bark	Brazil	Not stated	BA2003
Brosimine A	Flavonoid	Trunk Bark Bark	Brazil Brazil	00.00069% Not stated	H25999 BA2003
Brosimine B	Flavonoid	Trunk Bark	Brazil	00.000345%	H25999
Catechin, epi: (-):	Flavonoid	Stem Bark	Brazil	Not stated	H22696
Catechin, epi: 5-o-beta-d-xylopyranoside: (-):	Flavonoid	Stem Bark	Brazil	Not stated	H22696
Coniferaldehyde	Phenylpropanoid	Trunk Bark	Brazil	00.00076%	H25999
Coniferyl alcohol, dihydro-dehydro:	Phenylpropanoid	Bark	Brazil	00.00081%	H30578
Cordoin, iso: hydroxy:	Flavonoid	Bark	Brazil	00.00073%	H25999
Flavan, 3'-7-dihydroxy-4'-methoxy:	Flavonoid	Bark Trunk Bark	Brazil Brazil	00.00032% 00.00069%	H28814 H25999
Flavan, 4'-7-dihydroxy:	Flavonoid	Bark Bark	Brazil Brazil	00.00017% 00.00032%	H28814 H30830
Flavan, 4'-7-dihydroxy-8-prenyl:	Flavonoid	Stem Bark Bark	Brazil Brazil	00.0276% Not stated	H26321 BA2002
Flavan, 4'-hydroxy-7-8-(3''-hydroxy-2''-2''-dimethyl-pyran):	Flavonoid	Bark	Brazil	00.00052%	H18995
Flavan, 4'-hydroxy-7-8-(2''-2''-dimethyl-pyran):	Flavonoid	Bark Bark	Brazil Brazil	00.00023% 00.00193%	H28814 H18995
Icariside E-3 aglycone	Lignan	Bark	Brazil	00.00086%	H30578
Lariciresinol, iso: seco:	Lignan	Bark	Brazil	00.00072%	H30578
Liquiritigenin, (-):	Flavanone	Bark	Brazil	00.0000067%	H30830
Liquiritigenin, iso:	Flavonoid	Trunk Bark	Brazil	00.00017%	H25999
Liquiritigenin	Flavanone	Trunk Bark	Brazil	00.000304%	H25999

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Lonchocarpin, hydroxy:	Flavonoid	Trunk Bark	Brazil	00.00086%	H25999
Luteolin	Flavone	Bark	Brazil	00.000067%	H30830
Mururin A	Coumarin	Bark	Brazil	00.0004%	H30578
Mururin B	Coumarin	Bark	Brazil	00.00011%	H30578
Mururin C	Lignan	Bark	Brazil	00.00019%	H30578
Naringenin, (-):	Flavanone	Bark	Brazil	00.00015%	H30830
Protocatechuic Acid	Benzenoid	Stem Bark	Brazil	Not stated	H22696
Sitosterol, beta:	Steroid	Trunk Bark	Brazil	00.00134%	H25999
Stigmasterol	Steroid	Trunk Bark	Brazil	00.001%	H25999
Syringaldehyde	Benzenoid	Trunk Bark	Brazil	00.00076%	H25999

Biological Activities for Extracts of Tamamuri (*Brosimum acutifolium*)

Plant Part - Origin	Activity Tested For	Type Extract	Test Model	Dosage	Result	Notes/Organism tested	Ref #
Bark - Brazil	Toxic Activity	ETOH	Rat	Various	Inactive	No toxicity noted at any dosage tested.	BA2006
Bark - Brazil	Cytotoxic Activity	Fractions: brosimacutins	Cell Culture	IC50: 4.4 mg/ml IC50: 19 mg/ml	Active	P388 murine leukemia cells & vincristine-resistant leukemia cells	BA2003
Bark - Brazil	Cytotoxic Activity	H2O ext DMSO ext	Cell Culture	100 ug / plate	Active	HT29 and NCI-H460 human cancer cell lines (colon, lung)	BA2004
Bark - Brazil	Anti-inflammatory Activity	ETOH Hexane	PO Rat	Various	Active	Significantly reduced edema from several laboratory generated inflammatory processes.	BA2007
Bark - Brazil	Protein Kinase Inhibitory Activity	Fractions: Mururin B	In vitro	20 microM	Active	Inhibited Protein Kinase A by 58%	H30578
Bark - Brazil	Protein Kinase Inhibitory Activity	Fractions: Mururin A	In vitro	20 microM	Equivocal	Inhibited Protein Kinase A by 3%	H30578
Bark - Brazil	Protein Kinase Inhibitory Activity	Fractions: Mururin A	In vitro	20 microM	Active	Inhibited Protein Kinase C by 63%	H30578
Bark - Brazil	Protein Kinase Inhibitory Activity	Fractions: Mururin B	In vitro	20 microM	Active	Inhibited Protein Kinase C by 38%	H30578
Bark - Peru	Anti-yeast Activity	ETOH ext	Agar plate	Not stated	Active Active	<i>Candida albicans</i> <i>Saccharomyces cerevisiae</i>	BA2005
Bark - Peru	Anti-fungal Activity	ETOH ext	Agar plate	Not stated	Active Inactive	<i>Epidermoophyton floccosum</i> <i>Trichophyton metagrophytes</i>	BA2005
Bark - Peru	Anti-bacterial Activity	ETOH ext	Agar plate	Not stated	Active Active Active Inactive Inactive	<i>Bacillus cereus</i> <i>Staphylococcus aureus</i> <i>Helicobacter pylori</i> <i>Pseudomonas aeruginosa</i> <i>Escherichia coli</i>	BA2005

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H22696	(-)-EPICATECHIN 5-O-BETA-D-XYLOPYRANOSIDE FROM BROSIMOPSIS ACUTIFOLIUM. FERRARI,F: DELLE MONACHE,F: DE LIMA,RA: PHYTOCHEMISTRY (1998) 47 (6) PP. 1165-1166 UNIV CATTOLICA SACRO CUORE CENT CHIM RECETTORI DEL CNR ROME ITALY
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H26321	STRUCTURE DETERMINATION BY H AND C NMR OF A NEW FLAVAN ISOLATED FROM BROSIMUM ACUTIFOLIUM: 4',7-DIHYDROXY-8-PRENYLFLAVAN. TEIXEIRA,AF: ALCANTARA,AF: PILO VELOSO,D: MAGN RESON CHEM (2000) 38 (4) PP. 301-304 FUND UNIV AMAZONAS DEP CHEM ICE MANAUS BRAZIL
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