Technical Data Report

for

Matico

(Piper aduncum, angustifolium)

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Matico

Family: Piperaceae
Taxon: *Piper aduncum* L.
Synonyms: *Artanthe adunca* Miq.*, Piper angustifolium* Ruiz & Rav., Piper *celtidifolium* Kunth., *Piper elongatum* Vahl.
Common Names: anisillo, aperta-ruão, bamboo piper, cordoncillo, cordoncillo negro, erba di soldato, erva-de-jaboti, erva-de-soldado, false kava, gaa ma da oedoe, guayayo, gusanillo, herbe du soldat, higuillo, higuillo de hoja, hoja santa, jaborandi falso, jawawa, jointwood, kakoro, malembe toto, man-anihs, matico pepper, matico, maticoblätter, matika, matiko, menuda, moco-moco, moho-moho, mucumucu, pimenta de fruto ganxoso, pimenta-de-fruto-ganchoso, pimenta-de-macaco, pimenta-matico, Santa Maria negro, shiatani, soldaten kraut, soldier's herb, spiked pepper, tapa-curaco, tokondé, tupa burraco, upnpoingpoing, wer-ui-qui-yik
Part Used: Leaves

Herbal Properties & Actions		
Main Actions:	**Other Actions:**	**Standard Dosage:** Leaves
heals wounds	reduces mucous	**Infusion:** 1 cup 2-3 times daily
stops bleeding	calms coughs	**Fluid Extract:** 2-3 ml twice daily
stops vomiting	decongestant	**Capsules:** 1-2 g 2-3 times daily
eases nausea	aids urinary tract	
aids digestion	kills viruses	
expels gas		
kills germs		
kills bacteria		
kills yeast		
kills fungi		

Matico belongs to the *Piperaceae* or pepper family. The *Piper* genus which includes more than 2,000 species of shrubs, trees and vines and includes two other well known plants— black pepper *(Piper nigrum)* and kava-java *(Piper methysticum)*.

Matico is a tropical, evergreen, shrubby tree that grows to the height of 6 to 7 m with lanceolate leaves that are 12 to 20 cm long. It is native to most all of tropical South America as well as Southern Mexico, the Caribbean, and much of tropical Latin America. Once cultivated as an ornamental worldwide, it has naturalized in tropical Asia, Polynesia, and Melanesia and can even be found in southern Florida, Hawaii, and Puerto Rico. In some countries matico is considered as an introduced noxious weed. The tree produces cord-like, white to pale yellow, inflorescence spikes that contain many minute flowers that are wind-pollinated and that soon develop into numerous tiny drupes with black seeds. The seeds are then scattered easily by bats and birds. From these many seeds, it can form large stands of quickly-growing shrubby trees that can choke out other native vegetation. Established plants also thicken into clumps or stands by suckers arising from the root crown.

TRIBAL AND HERBAL MEDICINE USES

Like many plants in the pepper family, most all parts of the Matico tree have a aromatic, spicy, peppery taste and smell. The fruits are often used as a condiment and pepper substitute. Throughout the Amazon, many of the Indian tribes use matico leaves as an antiseptic wound healer

to stop bleeding, prevent infections and to speed healing. The leaves are either crushed or powdered and sprinkled directly onto the cut, wound, ulcer, and/or boil, or a tea (infusion) is made from the leaves and used as a wash. Sometimes the leaves are heated, pounded and then used as a poultice instead. The Shipibo-Conibo Indians also prepare the leaves in an infusion and use it to treat inflammation, diarrhea, gastritis, vomiting, fever, menstrual colic, internal infections and as a postpartum tonic.

In herbal medicine systems in South America, matico is quite well known and respected for wound healing as well a numerous other conditions. It is widely used as a remedy for all types of digestive disorders such as stomachaches, vomiting, dyspepsia, diarrhea, gastric ulcers, intestinal gas and even stomach cancer. It is also considered an excellent genitourinary tonic and used for kidney stones, urinary tract infections, cystitis, urethritis, leucorrhea, vaginitis, and various venereal diseases such as gonorrhea and trichomonas. In addition, it is also employed for various upper respiratory conditions such as bronchitis, pulmonary hemorrhages, pleurisy, pneumonia, colds and flu, and tonsilitis and sore throats.

The Spanish name, matico, comes from a South American legend. The plant was supposedly discovered by a wounded Spanish soldier named Matico. He learned (probably from the Indians) that applying the leaves to his wounds stopped them from bleeding, and it began to be called “matico” or “soldier’s herb or tree.” In was introduced into the profession of medicine in the United States and Europe by a Liverpool physician in 1839 as a styptic and astringent for wounds. Early medical texts in the U.S. include matico as it appeared in the *United States Pharmacopoeia* in the early nineteenth century. It was also recommended for leucorrhea, gonorrhea, hemorrhoids, blenorrhagia, dyspepsia, internal hemorrhages, (pulmonary, gastric ulcers, and postpartum bleeding) as well as diarrhea, dysentery, and cholera.

PLANT CHEMICALS

Matico contains many active chemicals including flavonoids, sequiterpenes, monoterpenes, heterocycles, phenylpropanoids, alkaloids, and benzenoids.[1-7] A group of chemicals called chromenes have been found in the leaves (and its essential oil) which have evidenced toxic effects to cancer cells and bacteria.[8,9] Other chemicals, including a group of bezenoid chemicals, have also demonstrated antibacterial and cytotoxic actions as well.[10-12] Matico is also contains a chemical called safrol which has been used successfully in powerful insecticides, fragrances, soaps and detergent products.[13]

The chemicals identified in matico thus far include: (+)caryophyllenol I, (-)cubebol, 1-2-3-trimethoxy-5-(2-propenyl)-benzene, 1-8 cineol, 2-6-dimethoxy-4-(2-propenyl)-phenol, 2-acetoxy-1-3-dimethoxy-5-(prop-2-enyl)-benzene, 3-(6-hydroxy-3-7-dimethyl-2-7-benzoic acid methyl ester, 5-methoxy-6-(2'-propenyl)-benzodioxole, 5-methoxy-6-(2-propenyl)-benzo-1-3-dioxole, 7-hydroxy-5-methoxy-dihydro-flavone, aduncamide, adunctin A thru E, aduncumene, alpha-copaene, alpha-cubebene, alpha-humulene, alpha-muurolene, alpha-phellandrene, alpha-pinene, alpha-terpinene, alpha-tocopherol, aromadendrene, asebogenin, benzoic acids, beta-bisabolol, beta-caryophyllene, beta-cymene, beta-elemene, beta-gurjunene, beta-pinene, beta-selinene, beta-sitosterol, bicyclogermacrene, borneol, borneol acetate, cadinene, camphene, camphor, caryophyllene, chalcones, chromenes, cis-ocimene, copaene, dihydro-chalcones, dill apiol, eremophilene, eupatoriochromene, geraniol acetate, germacrene D, germacrene B, globulol, isoborneol, limonene, linalool, lutein, methyl-lindaretin, myrcene, myristicin, nerol acetate, nerolidol, nervogenic acid, octa-trans-2-7-dienoic acid,6(s)-hydroxy-2-6-dimethyl methyl ester, pinostrobin, piperaduncin A thru C, piperitone, safrole, sakuranetin, seichelene, spathulenol, stigmasterol, tectochrysin, terpineol acetate, thymol, trans-ocimene, trans-phytol, undecanone, verbascoside, and viridiflorol.

BIOLOGICAL ACTIVITIES AND CLINICAL RESEARCH

Matico has demonstrated broad spectrum antimicrobial actions which may help to explain its long history of use for various infections and infectious diseases. In various laboratory studies over the years, matico leaves and the essential oil from the leaves or fruits have demonstrated antibacterial actions against various gram-positive and gram-negative bacteria.[1,8,9,11,12,14-16] It has also been reported with actions against fungi [8, 15-19] and yeast.[15-17] In addition, researchers in France reported matico had antiviral actions against polio virus.[20]

Other research has focused on matico being a possible treatment for a tropical disease called leishmaniasis that is quite prevalent in the Amazon and the South American tropics. Leishmaniasis is a parasitic disease spread by the bite of infected sand flies. There are several different forms of leishmaniasis. The most common forms are cutaneous leishmaniasis, which causes skin sores, and visceral leishmaniasis, which affects some of the internal organs of the body (for example, spleen, liver, bone marrow). In two studies, matico (and an extracted chalcone chemical from the plant) was reported to either kill the parasite or treat the disease in laboratory animals.[21,22] Another rather nasty tropical disease of the tropics is schistosomiasis. This parasitic disease is carried and spread by fresh water snails found in the many rivers and streams of the Amazon basin. In several other studies matico was reported with molluscicidal actions against the snail and the parasite it carries.[8,11,12] It also was reported with insecticidal actions against the mosquito that carries and spreads yellow fever.[23]

CURRENT PRACTICAL USES

While very little research has been conducted on matico specifically to validate its many traditional uses, its documented antibacterial and antiviral actions do support its use for various upper respiratory infections, urinary tract infections, sexually transmitted diseases, as well as an antiseptic and disinfectant for wounds. Despite any scientific validation, it still remains a main-stay in herbal medicine practices in South America for many types of digestive problems and it is quite well known and well respected for those types of conditions.

Matico Plant Summary
Main Actions (in order): stomachic, carminative, vulnerary, antiseptic, hemostat
Main Uses: 1. for digestive problems (vomiting, nausea, stomachaches, dyspepsia) 2. as a carminative and stomachic to expel intestinal gas and aid digestion 3. as an antiseptic wound healer for cuts, scrapes, ulcers, boils, etc. 4. as a hemostat for internal bleeding (uterine, gastric, pulmonary) 5. for colds, flu, coughs, bronchitis, pneumonia and other respiratory problems
Properties/Actions Documented by Research: antibacterial, anticandidal, antifungal, anti-leishmaniasis, antiyeast, antiviral, cytotoxic, insecticidal, molluscicidal
Properties/Actions Documented by Traditional Use: anti-hemorrhagic, anti-inflammatory, antiseptic, antispasmodic, astringent, carminative, cicatrizant, chologogue, decongestant, depurative, disinfectant, diuretic, expectorant, hemostat, nervine, panacea, purgative, resolvent, stomachic, stimulant, styptic, tonic, vulnerary
Cautions: None reported.

Traditional Preparation: Matico leaves are traditionally prepared in infusions and decoctions. Manufactured products available in North and South America also include fluid extracts and tinctures, as well as capsules.

Contraindications: None reported.

Drug Interactions: None reported.

WORLDWIDE ETHNOMEDICAL USES	
Brazil	as a anti-inflammatory, antispasmodic, astringent, balsamic, carminative, chologogue, diuretic, hemostat, resolvent, stimulant, stomachic, tonic and vulnerary; for blenorrhagia, bronchitis, coughs, cystitis, diarrhea, digestive disorders, dysentery, erysipelas, hematuria, hemorrhoids, hemorrhages, inflammation, leucorrhea, liver pain, menorrhagia, prolapsed uterus, pylitis, skin ulcers, snakebite, sores, urinary disorders, urethritis, urinary tract infections, uterine tonic, and wounds
Colombia	as a diuretic and stimulant, for constipation, headaches, kidney stones, leucorrhea, nose bleeds, pneumonia, pulmonary hemorrhages, and stomachaches
Dominican Republic	as an astringent, diuretic, stimulant, and stomachic
Guatemala	for gonorrhea
Guyana	as a vulnerary for sores and wounds
Haiti	as an aphrodisiac and hemostat; for abdominal pain, blenorrhagia, dropsy, leucorrhea, liver problems, rheumatism, skin problems, sores, and wounds
Honduras	as a digestive aid, childbirth aid, and skin cleanser; for aches, hemorrhages, menstrual pain
Jamaica	for stomachaches
Mexico	as an astringent, balsamic, diuretic, stimulant and styptic; for venereal diseases
New Guinea	as an antiseptic cleanser; for colds, diarrhea, and wounds
Panama	for bronchitis, cancer, decubitus ulcers, digestive disorders, pleurisy, pneumonia, respiratory problems, stomach ailments, trichomonas, ulcers, uterine fibroids, uterine ulcers, vaginitis, and wounds
Peru	as a anti-hemorrhagic, anti-inflammatory, antiseptic, astringent, carminative, cicatrizant, depurative, disinfectant, diuretic, expectorant, hemostat, nervine, panacea, purgative, stomachic, stimulant, styptic, tonic and vulnerary; for abscesses, blenorrhagia, boils, bronchitis, cholera, colds, conjunctivitis, constipation, cystitis, diarrhea, dysentery, dyspepsia, enteritis, fever, gastritis, gastric ulcers, gonorrhea, herpes ulcers, hemorrhoids, infections, inflammation, internal hemorrhages, kidney pain, kidney stones, leucorrhea, malaria, menstrual colic, neuralgia, postpartum hemorrhages, rheumatic pain, skin ulcers, sore throat, stomachaches, stomach cancer, stomach disorders, tonsilitis, ulcers, urinary infections, uterine disorders, uterine fibroids, vaginitis, venereal diseases, vomiting, and wounds
Puerto Rico	as a tonic; for diarrhea, dysentery, vomiting, ulcers, and to control bleeding.

WORLDWIDE ETHNOMEDICAL USES	
United States	as an astringent, hemostat, stimulant, styptic, urinary tonic, and vulnerary; for blenorrhagia, catarrh, cuts, diarrhea, dysentery, dyspepsia, genito-urinary conditions, gonorrhea, hemorrhoids, leucorrhea, postpartum hemorrhages, pulmonary hemorrhages, ulcers, and wounds

References:

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Ethnomedical Information on Matico (Piper aduncum, angustifolium)

Part / Location	Documented Ethnomedical Uses	Type Extract / Route	Used For	Ref #
Leaf / Brazil	Used as a stimulant and diuretic; for blenorrhagia, inflammation, cystitis, prolapsed uterus, diarrhea, dysentery, and pyelitis (pelvic inflammation). Used for chronic wounds.	Infusion / Oral Infusion / External	Human Adult	ZZ1013
Leaf / Brazil	Used as a diuretic, astringent, stomachic, and balsamic; for urinary problems and infections, cystitis, urethritis, blenorrhagia, diarrhea, digestive disorders, coughs, hematuria, bronchitis, leucorrhea, and liver pain. Used for skin ulcers, hemorrhoids, and wounds. Used in baths for prolapsed uterus.	Decoction / Oral Decoction / External Bath / External	Human Adult	ZZ1007
Leaf / Brazil	Used as an anti-inflammatory, tonic, carminative, stomachic, and antispasmodic; for blenorrhagia, digestive disorders, and liver problems. Taken as uterine tonic to prevent prolapse.	Infusion / Oral	Human Adult	ZZ2005 ZZ1099
Leaf / Brazil	Used as a stomachic, resolvent, balsamic, astringent, and hemostat. Used for bad digestion, wound healing, treatment of sores, leucorrhea, and menorrhagia.	Decoction / Oral and External	Human Adult	ZZ1099
Root / Brazil	Used as a chologogue, and stimulant. Used for snake bite and erysipelas.	Not stated / Oral Not stated / External	Human Adult	ZZ2005 ZZ1099
Leaf Colombia	Used for pulmonary hemorrhages. Leaf powder inhaled to stop nose bleeding. Used as a diuretic; for leucorrhea, kidney stones, and stomachaches. Used for constipation and pneumonia.	Decoction / Oral Powder / Nasal Infusion / Oral Decoction / Oral	Human Adult	ZZ1093
Leaf / Colombia	Used as a stimulant and for headaches.	Tincture / Oral	Human Adult	ZZ2007
Leaf / Guatemala	Used for gonorrhea.	Infusion / Oral	Human Adult	K27236
Leaf / Guyana	Macerated leaves and stems used to heal sores.	Maceration / External	Human Adult	ZZ1104
Leaf / Haiti	Used for abdominal pain.	Decoction / Oral	Human Adult	T13846

Part / Location	Documented Ethnomedical Uses	Type Extract / Route	Used For	Ref #
Leaf / Honduras	Used for aches, pains, female disorders (menstrual pains, hemorrhage, and childbirth), and as a digestive aid. Used as a skin cleanser.	Decoction / Oral Decoction / External	Human Adult	L25561
Leaf / Jamaica	Used for stomachaches.	Infusion / Oral	Human Adult	J11219
Leaf / New Guinea	Used for colds and diarrhea.	Infusion / Oral	Human Adult	J11219
Leaf / New Guinea	Used to heal wounds and as a topical antiseptic cleanser.	Infusion / External	Human Adult	J11219 H13492
Leaf / Panama	Decoction of 5-6 leaves in 1 liter of water used as vaginal douche against *Trichomonas*.	Decoction / Vaginal	Human Adult	T01287
Leaf / Panama	Used for uterine ulcers and stomach ailments.	Decoction / Oral	Human Adult	T01287
Leaf / Panama	Leaf juice used to heal wounds.	Juice / External	Human Adult	T01287
Leaf / Peru	Used for malaria, gonorrhea, dysentery, bronchitis, and inflammation.	Infusion / Oral	Human Adult	L04137 ZZ1041 ZZ1027
Leaf / Peru	Leaves eaten as a “cure-all.”	Leaves / Oral	Human Adult	L03868
Leaf / Peru	Karijona Indians and others use dried leaves sprinkled on wounds as a styptic and vulnerary.	Leaves / External	Human Adult	L04137 ZZ1005 ZZ2009 ZZ2007
Leaf / Peru	Used as an anti-inflammatory; for stomach disorders, colds, gastric ulcers, gastric cancer, kidney stones, urinary infections, and diarrhea. Used for gonorrhea, leucorrhea, and venereal diseases. Used as an astringent and cicatrizant for wounds, hemorrhoids, and ulcers. Used for tonsilitis and sore throats. Used topically on herpes ulcers. Used as a vaginal antiseptic.	Infusion / Oral Decoction / External Decoction / External Decoction / Gargle Juice / External Decoction / Douche	Human Adult	ZZ1101
Leaf / Peru	Used for urinary infections, colds, diarrhea, and bronchitis. Used for skin ulcers and herpes ulcers. Used for wounds and as a vaginal antiseptic.	Infusion / Oral Fresh / External Decoction / External	Human Adult	ZZ1008

Part / Location	Documented Ethnomedical Uses	Type Extract / Route	Used For	Ref #
Leaf / Peru	Used as a stomachic and purgative.	Infusion / Oral	Human Adult	ZZ2010
Leaf / Peru	Used for stomachaches, gonorrhea, and other venereal diseases.	Infusion / Oral	Human Adult	ZZ1105
Leaf / Peru	Taken as a tonic and for stomach pain. Used for neuralgia and rheumatic pain.	Infusion / Oral Bath / External	Human Adult	ZZ2007
Leaf / Peru	Used in ritual baths for enteritis and stomachaches.	Bath / External	Human Adult	L04137 ZZ1045
Leaf / Peru	Used as an antiseptic wound healer.	Infusion / External	Human Adult	L04137 ZZ1041 ZZ1027
Leaf / Peru	Used for malaria.	Decoction / Oral	Human Adult	ZZ2016
Leaf / Peru	Used as a hemostat and disinfectant; for wounds and conjunctivitis.	Decoction / External	Human Adult	ZZ2009
Leaf / Peru	Used as an expectorant, antidysenteric, astringent, antihemorrhagic, anti-inflammatory, diuretic, carminative, and antiseptic; for stomachaches, tonsilitis, stomach ulcers, internal hemorrhages, and urinary infections.	Infusion / Oral	Human Adult	ZZ2013
Leaf / Peru	Used for gonorrhea, leucorrhea, digestive cancers, tonsilitis, kidney stones, bronchitis, cystitis, uterine fibroids, constipation, and blenorrhagia.	Decoction / Oral	Human Adult	ZZ2013
Leaf / Peru	Used for wounds, hemorrhoids, and cutaneous ulcers. Used as an antiseptic vaginal douche for vaginitis. Powdered leaves used as a antiseptic, hemostat and vulnerary. Leaf juice used topically on herpes ulcers.	Decoction / External Decoction / External Leaves / External Juice / External	Human Adult	ZZ2013
Leaf / Peru	Leaf juice taken for throat pain and inflammation. Used for kidney pain and postpartum hemorrhages.	Juice / Oral Infusion / Oral	Human Adult	ZZ2009
Leaf / Peru	Shipibo-Conibo consider it sedative, nervine, anti-inflammatory, depurative, diuretic, and carminative; used for inflammation, diarrhea, gastritis, vomiting, fever, menstrual colic, postpartum tonic, and infections. Used for wounds, skin ulcers, abscesses, and boils.	Infusion / Oral Poultice / External	Human Adult	ZZ2003
Leaf / Peru	Used as an astringent, vulnerary and styptic; for wounds and cutaneous eruptions.	Infusion / External	Human Adult	ZZ1093

Part / Location	Documented Ethnomedical Uses	Type Extract / Route	Used For	Ref #
Leaf / Peru	Used for cholera, kidney stones, uterine disorders, and kidney problems.	Decoction / Internal	Human Adult	ZZ1093
Root / Peru	Used for rheumatism.	Tincture / Oral	Human Adult	ZZ2013
Leaves / Puerto Rico	Used as a tonic; for diarrhea, dysentery, vomiting, ulcers, and to control bleeding.	Infusion / Oral	Human Adult	PA1012
Leaf / USA	Used as an astringent for topical applications. Used for diarrhea.	Infusion / External Infusion / Oral	Human Adult	W03968
Leaf / USA	Used for leucorrhea, gonorrhea, hemorrhoids, blenorrhagia, and dyspepsia. Used for ulcers and to stop wounds from bleeding.	Infusion / Oral Infusion / External	Human Adult	ZZ2019
Leaf / USA	Considered, soothing, diffusive, stimulating and astringent; used for pulmonary hemorrhages, postpartum hemorrhages, diarrhea, dysentery, cholera, and as a birthing aid.	Infusion / Oral	Human Adult	ZZ2020
Leaf / USA	Used as an aromatic, stimulant and urinary tonic; for chronic mucous discharges (leucorrhea, gleet, catarrh, etc.) and hemorrhages. Used topically on cuts, wounds, and indolent ulcers.	Fluid extract / Oral Fluid extract / External	Human Adult	ZZ2021
Leaf / USA	Used as a styptic and astringent for wounds.	Infusion / External	Human Adult	ZZ2022
Leaf / USA	Used as an aromatic, bitter stimulant for catarrhal states of the stomach and genitourinary tract.	Tincture / Oral	Human Adult	ZZ2023
Plant / Dominican Republic	Used as a stimulant, stomachic, diuretic, and astringent.	Not stated	Human Adult	ZZ1022
Plant / Haiti	Used as an aphrodisiac and hemostat; for leucorrhea, rheumatism, blenorrhagia, skin problems, sores, dropsy, and liver problems.	Not stated	Human Adult	ZZ1022
Plant / Latin America	Used as an astringent, antiseptic, styptic, vulnerary, diuretic, and stimulant; for urinary problems.	Not stated	Human Adult	ZZ1022 ZZ1106
Plant / Mexico	Used as an astringent, balsamic, diuretic, styptic, and stimulant; for venereal diseases.	Not stated	Human Adult	ZZ1022 ZZ1106
Plant / Panama	Used for bronchitis, cancer, decubitus ulcers, uterine fibroids, pleurisy, pneumonia, respiratory problems, stomach problems, trichomoniasis, ulcers, uterine disorders, vaginitis and wounds.	Not stated	Human Adult	ZZ1106 ZZ1022

Presence of Compounds in Matico (Piper aduncum, angustifolium)

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Aduncamide	Isoquinoline Alkaloid	Leaf	Papua-New Guinea	00.00254%	H15638
Aduncumene	Benzenoid	Leaf	Brazil	Not stated	PA1004
Adunctin A	Flavonoid	Leaf	Papua-New Guinea	00.0014%	H12260
Adunctin B	Flavonoid	Leaf	Papua-New Guinea	00.000309%	H12260
Adunctin C	Flavonoid	Leaf	Papua-New Guinea	00.00118%	H12260
Adunctin D	Flavonoid	Leaf	Papua-New Guinea	00.00038%	H12260
Adunctin E	Flavonoid	Leaf	Papua-New Guinea	00.00047%	H12260
Aromadendrene, allo:	Sesquiterpene	Essential Oil Essential Oil	Peru Brazil	02.8% 00.8%	J11125 PA1010
Asebogenin	Flavonoid	Leaf	Papua-New Guinea	00.00658%	H12260
Benzene, 1-2-3-trimethoxy-5-(2-propenyl):	Phenylpropanoid	Leaf	Ecuador	00.0071%	H28653
Benzene, 2-acetoxy-1-3-dimethoxy-5-(Prop-2-enyl):	Phenylpropanoid	Leaf	Ecuador	00.0043%	H28653
Benzo-1-3-dioxole,5-methoxy-6-(2-propenyl):	Phenylpropanoid	Leaf	Ecuador	00.0086%	H28653
Benzodioxole,5-methoxy-6-(2'-propenyl):	Phenylpropanoid	Essential Oil	Peru	Not stated	M17675
Benzoic acid methyl ester, 3-(6-hydroxy-3-7-dimethyl-2-7-octadienyl))-4-methoxy:	Benzenoid	Leaf	Papua-New Guinea	Not stated	H12467
Benzoic acid, 4-methoxy-3-5-bis-3'-methyl:	Benzenoid	Leaf	USA	00.36666%	J12219
Benzoic acid, 3-(2-hydroxy-3-methyl-3-butenyl)-4-hydroxy: methyl ester	Benzenoid	Leaf	Papua-New Guinea	00.00046%	H13492
Benzoic acid, 3-(3'-7'-dimethyl-octa-2'-6'-dienyl)-4-methoxy:	Benzenoid	Leaf	Brazil	Not stated	H25768

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Benzoic acid, 3-(6-hydroxy-3-7-dimethyl-2-7-octadienyl)-4-methoxy: methyl ester	Benzenoid	Leaf	Papua-New Guinea	00.00040%	H13492
Benzoic acid, 3-5-bis-(3-methyl-2-butenyl)-4-methoxy:	Benzenoid	Leaf	Ecuador	00.002%	H28653
Benzoic acid, 3'-methyl: 3-5-bis: 4-methoxy:	Benzenoid	Flower + Leaf + Stem	Honduras	Not stated	L25561
Benzoic acid, 4-hydroxy-3-(3-methyl-2-buten-1-oxo-yl-5-(3-methyl-2-butenoyl):	Benzenoid	Leaf	Papua-New Guinea	Not stated	H12467
Benzoic acid, 4-methoxy-3-5-bis(3'-methyl-but-2'-en-1'-yl):	Benzenoid	Fruit	Jamaica	00.70000%	H01991
Benzoic acid-1-(1-methyl-ethyl)-4-methyl-3-cyclohexenyl ester, 4-hydroxy-3-5-bis(3-methyl-2-butenyl):	Benzenoid	Leaf	Papua-New Guinea	Not stated	H12467
Bicyclogermacrene	Sesquiterpene	Essential Oil	Brazil	11.2%	PA1010
Bisabolol, beta:	Sesquiterpene	Essential Oil	Peru	04.5%	J11125
Borneol	Monoterpene	Essential Oil	Peru	02.4%	J11125
Borneol, iso:	Monoterpene	Essential Oil	Peru	12.8%	J11125
Borneol acetate	Monoterpene	Stem Essential Oil	Brazil Peru	< 01.0% 01.4%	H22172 J11125
Camphene	Monoterpene	Essential Oil	Peru	22.4%	J11125
Camphor	Monoterpene	Leaf Essential Oil	Brazil Peru	Traces 25.3%	T05815 J11125
Cadinene	Sesquiterpene	Essential Oil	Brazil	03.0%	PA1010
Caryophyllene	Sesquiterpene	Stem Essential Oil	Brazil Peru	17.81% 3.9%	H22172 J11125
Caryophyllene, beta	Sesquiterpene	Essential Oil	Brazil	09.1%	PA1010
Caryophyllenol I, (+):	Sesquiterpene	Leaf	Papua-New Guinea	00.00025%	H15638

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Chalcone, 2'-6'-dihydroxy-4'-methoxy:	Flavonoid	Inflorescence Fruit Leaf	Brazil Brazil USA	Not stated 00.06% 00.034%	L03546 H22172 J11219
Chalcone, 2-6-dihydroxy-4-methoxy:	Flavonoid	Flower + Leaf + Stem	Honduras	Not stated	L25561
Chalcone, dihydro: 2'-4'-6'-trihydroxy-4'-methoxy:	Flavonoid	Leaf	Papua-New Guinea	00.05420%	H14310
Chalcone, dihydro: 2'-4-dihydroxy-3-4'-6'-trimethoxy:	Flavonoid	Fruit	Brazil	00.005335%	H22172
Chalcone, dihydro: 2'-4-dihydroxy-4'-6'-dimethoxy:	Flavonoid	Fruit	Brazil	00.005335%	H22172
Chalcone, dihydro: 2'-6'-dihydroxy-4'-dimethoxy:	Flavonoid	Fruit Leaf Leaf Leaf Fruit	Brazil Brazil Not stated Ecuador Jamaica	00.05% Not stated Not stated 00.0057% 00.24667%	H22172 H25768 T09627 H28653 H01991
Chalcone, dihydro: 2'-hydroxy-4'-6'-dimethoxy:	Flavonoid	Fruit	Brazil	00.06%	H22172
Chromene, 2(h): 2-2-dimethyl-8-(3-methyl-but-2-enyl): 6-carboxylic acid methyl ester	Oxygen Heterocycle	Leaf	Brazil	Not stated	H25768
Chromene, 2(h)-1: 2-2-dimethyl: 6-carboxylic acid	Oxygen Heterocycle	Leaf	Brazil	Not stated	H25768
Chromene, 2(h)-1: 2-2-dimethyl: 6-carboxylic acid methyl ester	Oxygen Heterocycle	Leaf	Brazil	Not stated	H25768
Chromene, 2(h)-1: 8-hydroxy-2-2-dimethyl: 6-carboxylic acid methyl ester	Oxygen Heterocycle	Leaf	Brazil	Not stated	H25768
Chromene, methyl-2-2-dimethyl-8-(3-methyl-2-butenyl)-2(h): 6-carboxylate	Oxygen Heterocycle	Stem	Brazil	40.0%	H22172
Chromene-6-carboxylic acid,2(h):2-2-dimethoxy-8-(3-methyl-2-butenyl):	Oxygen Heterocycle	Leaf Leaf+stem+ flower	USA Honduras	00.01783% Not stated	J11219 L25561
Chromene-6-carboxylic acid,2(h): 2-2-dimethyl: methyl ester	Oxygen Heterocycle	Leaf	Papua-New Guinea	00.00054%	H13492

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Chromene-6-carboxylic Acid,2(h): 2-2-dimethyl-8-(3-methyl-2-butenyl):	Oxygen Heterocycle	Leaf	Papua-New Guinea	00.00069%	H13492
Chromene-6-carboxylic Acid,2(h): 8-hydroxy-2-2-dimethyl: methyl ester	Oxygen Heterocycle	Leaf	Papua-New Guinea	00.00131%	H13492
Cineol, 1-8	Monoterpene	Stem	Brazil	< 01.0%	H22172
Copaene	Sesquiterpene	Stem	Brazil	03.01%	H22172
Copaene, alpha	Sesquiterpene	Essential Oil	Brazil	00.5%	PA1010
Cubebol, (-)	Sesquiterpene	Leaf	Papua-New Guinea	00.00098%	H15638
Cubebene, alpha	Sesquiterpene	Essential Oil	Peru	01.2%	J11125
Cymene, meta	Monoterpene	Stem	Brazil	07.86%	H22172
Dill Apiol	Phenylpropanoid	Leaf Leaf Essential Oil Essential Oil Essential Oil Leaf Leaf	Ecuador Ecuador Panama Colombia Fiji Brazil Brazil	00.14% 00.01% 90% Not stated 58.0% 74.5% 88.4%	H28653 H28653 L07890 M11727 T01389 T05815 T05815
Dill Apiol, pseudo	Phenylpropanoid	Fruit	Jamaica	01.030%	H01991
Elemene, beta	Sesquiterpene	Essential Oil	Brazil	01.0%	PA1010
Eremophilene	Sesquiterpene	Essential Oil	Peru	01.1%	J11125
Eupatoriochromene	Oxygen Heterocycle	Stem	Brazil	17.81%	H22172
Flavone, dihydro: 7-hydroxy-5-methoxy:	Flavanone	Fruit	Brazil	00.04333%	H22172
Geraniol acetate	Monoterpene	Stem Essential Oil	Brazil Brazil	02.05% 01.5%	H22172 PA1010
Germacrene B	Sesquiterpene	Essential Oil	Brazil	00.9%	PA1010

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Germacrene D	Sesquiterpene	Essential Oil	Brazil	04.2%	PA1010
Globulol	Sesquiterpene	Essential Oil	Brazil	00.5%	PA1010
Gurjunene, beta	Sesquiterpene	Essential Oil	Brazil	00.4%	PA1010
Humulene, alpha	Sesquiterpene	Essential Oil	Brazil	05.5%	PA1010
Limonene	Monoterpene	Essential Oil	Peru	02.5%	J11125
Linalool	Monoterpene	Essential Oil Essential Oil	Peru Brazil	02.1% 31.7%	J11125 PA1010
Lindaretin, methyl: (-):	Flavanoid	Leaf	Papua-New Guinea	00.00750%	H12260
Lutein	Carotenoid	Leaf	Papua-New Guinea	00.00262%	H14310
Muurolene, alpha	Sesquiterpene	Essential Oil	Brazil	00.5%	PA1010
Myrcene	Monoterpene	Stem Essential Oil	Brazil Peru	< 01.0% 00.7%	H22172 J11125
Myristicin	Phenylpropanoid	Leaf Leaf Essential Oil Essential Oil	Ecuador Ecuador Colombia Peru	00.0017% 00.0029% Not stated 03.9%	H28653 H28653 M11727 J11125
Nerol acetate	Monoterpene	Stem	Brazil	< 01.0%	H22172
Nerolidol	Sesquiterpene	Essential Oil	Brazil	10.4%	PA1010
Nervogenic acid	Benzenoid	Leaf Flower + Leaf + Stem	USA Honduras	00.029% Not stated	J11219 L25561
Ocimene, cis	Monoterpene	Essential Oil	Brazil	03.4%	PA1010
Ocimene, trans	Monoterpene	Essential Oil	Brazil	05.0%	PA1010

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Octa-trans-2-7-dienoic acid,6(s)-hydroxy-2-6-dimethyl: methyl ester	Monoterpene	Leaf	Papua-New Guinea	00.00098%	H13492
Phellandrene, alpha	Monoterpene	Stem	Brazil	< 01.0%	H22172
Phenol, 2-6-dimethoxy-4-(2-propenyl):	Phenylpropanoid	Leaf	Ecuador	00.0021%	H28653
Phytol, trans:	Diterpene	Leaf	Papua-New Guinea	00.00109%	H12260
Pinene, alpha:	Monoterpene	Essential Oil Essential Oil	Peru Brazil	04.8% 01.7%	J11125 PA1010
Pinene, beta:	Monoterpene	Stem Essential Oil	Brazil Brazil	< 01.0% 02.1%	H22172 PA1010
Pinostrobin	Flavanone	Fruit	Jamaica	01.54000%	H01991
Piperaduncin A	Flavonoid	Leaf	Papua-New Guinea	00.00092%	H14310
Piperaduncin B	Flavonoid	Leaf	Papua-New Guinea	00.00033%	H14310
Piperaduncin C	Flavonoid	Leaf	Papua-New Guinea	00.00032%	H14310
Piperitone	Monoterpene	Leaf Leaf Essential Oil Essential Oil	Papua-New Guinea Ecuador Colombia Fiji	Not stated Not stated Not stated 04.0%	H13492 H28653 M11727 T01389
Safrole	Phenylpropanoid	Leaf Leaf Essential Oil Essential Oil	Ecuador Ecuador Brazil Brazil	00.0017% 00.0067% 00.10% 3.24%	H28653 H28653 PA1008 PA1008
Sakuranetin, (DI):	Flavanone	Leaf	Papua-New Guinea	00.00054%	H14310
Seichelene	Sesquiterpene	Essential Oil	Brazil	01.1%	PA1010
Selinene, beta:	Sesquiterpene	Essential Oil	Peru	02.2%	J11125

Compound	Chemical Type	Plant Part	Plant Origin	Quantity	Ref #
Sitosterol, beta:	Steroid	Stem	Brazil Ecuador Not stated	00.001% 00.001% Not stated	H22172 H28653 T09627
Spathulenol	Sesquiterpene	Leaf Leaf Essential Oil	Papua-New Guinea Papua-New Guinea Brazil	Not stated 00.00045% 00.9%	H12467 H15638 PA1010
Stigmasterol	Steroid	Leaf Stem	Papua-New Guinea Brazil	Not stated 00.001%	H13492 H22172
Tectochrysin	Flavone	Stem	Brazil	00.00114%	H22172
Terpinene, alpha:	Monoterpene	Stem	Brazil	< 01.0%	H22172
Terpineol acetate	Monoterpene	Essential Oil	Peru	01.9%	J11125
Thymol	Monoterpene	Essential Oil	Peru	02.9%	J11125
Tocopherol, alpha:	Oxygen Heterocycle	Leaf	Papua-New Guinea	00.00225%	H12260
Undecanone	Sesquiterpene	Essential Oil	Brazil	00.4%	PA1010
Verbascoside	Phenylpropanoid	Entire Plant	Japan	Not stated	L12154
Viridiflorol	Sesquiterpene	Leaf	Papua-New Guinea	Not stated	H12467
Viridiflorol, (+):	Sesquiterpene	Leaf	Papua-New Guinea	00.00380%	H15638

Biological Activities of Matico (Piper aduncum, angustifolium)

Plant Part - Origin	Activity Tested For	Type Extract	Test Model	Dosage	Result	Notes/Organism tested	Ref #
Leaf - Brazil	Hypotensive Activity	Pet Ether ext CHCL3 ext Butanol ext	IP Mouse	Not stated	Active		T09627
Leaf - Malaysia	Binding Inhibition	MEOH ext	In vitro	200 mcg/ml	Active	Inhibited platelet activating factor (PAF) receptor binding by 53%.	J14055
Leaf - Malaysia	Binding Inhibition	MEOH ext	In vitro	Not stated	Active	PAF antagonist with IC50 values in 1.2 to 18 mcg/ml range	PA1003
Wood - Malaysia	Binding Inhibition	MEOH ext	In vitro	200 mcg/ml	Inactive		J14055
Leaf - Papua-New Guinea	Cytotoxic Activity	CH2CL2 ext	Cell Culture	IC50: 12 mcg/ml	Active	CA-9KB cancer cells	H14310
Leaf - Papua-New Guinea	Cytotoxic Activity	CH2CL2 ext	Cell Culture	Not stated	Active	CA-9KB cancer cells	H15638
Leaf - Brazil	Antiproliferation Activity	Infusion	IP Mouse	0.5 ml / animal	Equivocal	vs. LPS-induced proliferation: stimulated production of colony-stimulating factor	L07194
Leaf - Brazil	Mitogenic Activity	Infusion	Cell Culture	Not stated	Inactive	Splenocytes (mouse)	L07194
Leaf - Peru	Anticrustacean Activity	MEOH ext CH2CL2 ext	*Artemia salina*	ED50: 719 mcg/ml ED50: 220 mcg/ml	Equivocal Active	Assay system is intended to predict antitumor actitivty.	K28202
Leaf - Peru	DNA-Binding Effect	MEOH ext	In vitro	1 mg/ml	Inactive	DNA-methyl green assay.	K28202
Leaf - Papua-New Guinea	Antibacterial Activity	Petrol ext	Agar Plate	Not stated	Active	*Bacillus subtilis* *Micrococcus luteus* *Escherichia coli*	H13492

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Plant Part - Origin	Activity Tested For	Type Extract	Test Model	Dosage	Result	Notes/Organism tested	Ref #
Leaf - Papua-New Guinea	Antibacterial Activity	CH2CL2 ext	Agar Plate	Not stated	Active	*Micrococcus luteus* *Bacillus subtilis* *Escherichia coli*	H14310
Leaf - Papua-New Guinea	Antibacterial Activity	CH2CL2 ext	Agar Plate	Not stated	Active	*Micrococcus luteus* *Bacillus subtilis*	H15638
Leaf - Papua-New Guinea	Antibacterial Activity	Pet ether ext	Agar Plate	Not stated	Active	*Micrococcus luteus* *Bacillus subtilis* *Escherichia coli*	H12260
Leaf - Papua-New Guinea	Antibacterial Activity	Pet ether ext	Agar Plate	Not stated	Active	*Micrococcus luteus* *Bacillus subtilis* *Escherichia coli*	H14350
Aerial parts - Peru	Antibacterial Activity	Crude ext	Agar Plate	MIC: 1-2 mg/ml	Active	Gram + bacterial strains	PA1002
Aerial parts - Peru	Antibacterial Activity	Crude ext	Agar Plate	MIC: 16 mg/ml	Active	Gram - bacterial strains	PA1002
Essential Oil - Brazil	Antibacterial Activity	Essential Oil	Agar Plate	20 mg/ml 20 mg/ml 20 mg/ml	Active Active Active	*Staphylococcus aureus* *Bacillus subtilis* *Escherichia coli*	M24523
Flower+Leaf+Stem Honduras	Antibacterial Activity	ETOH ext	Agar Plate	100 mcl / plate	Active	Several bacterial strains.	L25561
Essential Oil - Peru	Antibacterial Activity	Essential Oil	Agar Plate	30 mcg/ml 200 mcg/ml 200 mcg/ml 100 mcg/ml	Equivocal Inactive Inactive Equivocal	*Pseudomonas aeruginosa* *Staphylococcus aureus* *Bacillus subtilis* *Escherichia coli*	J11125
Leaf USA	Antibacterial Activity	ETOHC ext	Agar Plate	100 mcg/ml	Equivocal	*Staphylococcus aureus*	J11219
Leaf USA	Antibacterial Activity	ETOH ext MEOH ext Hexane ext	Agar Plate	100 mcg/ml	Equivocal Equivocal Equivocal	*Staphylococcus aureus* *Bacillus subtilis* *Pseudomonas aeruginosa*	J11219
Not stated	Antibacterial Activity	Fluid ext	Agar Plate	Not stated	Inactive Inactive	*Staphylococcus aureus* *Escherichia coli*	A05300

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Plant Part - Origin	Activity Tested For	Type Extract	Test Model	Dosage	Result	Notes/Organism tested	Ref #
Leaf - Guatemala	Antibacterial Activity	ETOH-H2O	Agar Plate	50 mcl / plate	Inactive	*Neisseria gonorrhea*	K27236
Leaf - Papua-New Guinea	Antifungal Activity	Petrol	Agar Plate	Not stated	Active	*Penicillium oxalicum*	H13492
Essential Oil - Peru	Antifungal Activity	Essential Oil	Agar Plate	100 mcg/ml 200 mcg/ml 10 mcg/ml	Equivocal Inactive Active	*Aspergillus flavus* *Aspergillus fumigatus* *Trichophyton mentagrophytes*	J11125
Essential Oil - Brazil	Antifungal Activity	Essential Oil	Agar Plate	20 mg/ml	Active	*Aspergillus flavus* *Trichophyton mentagrophytes*	M24523
Essential Oil - Brazil	Antifungal Activity	Essential Oil	Agar Plate	MIC: 10 ug	Active	*Cladosporium cladosporoides* *Cladosporium sphaerospermum*	PA1010
Flower+Leaf+Stem Honduras	Antifungal Activity	ETOH ext	Agar Plate	100 mcl / plate	Active	Several fungal strains.	L25561
Leaf - Brazil	Antifungal Activity	Benzoid fraction	Agar Plant	Not stated	Active	*Cladosporium cladosporoides* *Cladosporium sphaerospermum*	PA1004
Essential Oil - Brazil	Antimycobacterial Activity	Essential Oil	Agar Plate	20 mg/ml	Active	*Mycobacterium smegmatis*	M24523
Essential Oil - Peru	Antimycobacterial Activity	Essential Oil	Agar Plate	200 mcg/ml	Inactive	*Mycobacterium intracellulare*	J11125
Leaf - USA	Antimycobacterial Activity	ETOH ext MEOH ext Hexane ext	Agar Plate	Not stated	Inactive	*Mycobacterium intracellulare*	J11219
Essential Oil - Peru	Antiyeast Activity	Essential Oil	Agar Plate	20 mg/ml	Active Active	*Cryptococcus neoformans* *Saccharomyces cerevisiae*	M24523
Flower+Leaf+Stem Honduras	Antiyeast Activity	ETOH ext	Agar Plate	100 mcl / plate	Active	Several yeast strains.	L25561

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Plant Part - Origin	Activity Tested For	Type Extract	Test Model	Dosage	Result	Notes/Organism tested	Ref #
Leaf - Guatemala	Antiyeast Activity	ETOH-H20	Agar Plate	Not stated	Inactive	*Candida albicans*	M31296
Essential Oil - Peru	Antiyeast Activity	Essential Oil	Agar Plate	50 mcg/ml 50 mcg/ml 200 mcg/ml	Active Active Inactive	*Candida albicans* *Cryptococcus neoformans* *Saccharomyces cerevisiae*	J11125
Leaf - USA	Antiyeast Activity	ETOH ext MEOH ext Hexane ext	Agar Plate	Not stated	Inactive	*Candida albicans* *Cryptococcus neoformans*	J11219
Leaf - Indonesia	Antiviral Activity	Not stated	Agar Plate	Not stated	Active	Polio virus	PA1005
Inflorescence-Brazil	Anti-leishmaniasis Activity	2CLMethane	In vitro	IC50: 24 mcg/ml	Active	*Leishmania amazonensis*	L03546
Inflorescence-Brazil	Anti-leishmaniasis Activity	DMC fraction	IP mouse	5 mg / animal	Active	*Leishmania amazonensis*	PA1006
Plant / Puerto Rico	Molluscicidal Activity	H20 Ext	*Lymnaea*	LD100 > 1M ppm	Inactive	Fruits, roots and leaves were tested against *L. cubesis* and *L. columella.*	T04621
Leaf - Papua-New Guinea	Molluscicidal Activity	Petrol	In vitro	Not stated	Active	*Biomphalaria glabrata*	H13492
Leaf - Papua-New Guinea	Molluscicidal Activity	Pet ether ext	In vitro	Not stated	Active	*Biomphalaria glabrata*	H14350
Leaf - Papua-New Guinea	Molluscicidal Activity	Petrol ext	In vitro	Not stated	Active	*Biomphalaria glabrata*	H15638
Leaf - Brazil	Insecticidal Activity	Essential Oil	In vitro	LD50: 0.51 ml/cm	Active	*Sitophilus zeamais*	PA1007
Leaf - Malaysia	Insecticidal Activity	Hexane	In vitro	LC50: 0.20 mg/cm	Active	*Aedes aegypti*	PA1001

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