

Coconut: The Earth's Most Widespread Medicinal Fruit Plant

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Besides hemp, there are few if any plants that produce as much food, shelter, and medicine as the coconut palm.

A new scientific review on the coconut palm (*Cocos nucifera*), referred to as "**the most naturally widespread fruit plant on Earth**," reveals its various constituents, which include husk, root, oil, water, and flesh, together possess the following 20 biological effects:

- Analgesic (Pain-Killing)
- Antibacterial
- Anti-diabetic
- Anti-fungal
- Anti-hypertensive
- Anti-viral
- Anti-parasitic
- Anti-Leishmanial
- Anti-inflammatory
- Antioxidant
- Antifungal
- Anti-malarial
- Anti-trichoemonal
- Anti-tumor activities
- Bone supportive
- Cardioprotective
- Depressant & Anticonvulsive
- Kidney Protective
- Liver protective



The table below reveals in detail what parts of the coconut palm are responsible for producing these aforementioned biological effects.

Table S1. Pharmacological Activities of various extracts of *Cocos nucifera* (L) and its fractions.

Plant part	Type of extract/fraction	Study model/Tests	Doses	Pharmacological activity	Ethnopharmacological claim	References
Husk fiber	Crude extract (CE); fractions (F1 e F2)	Acetic acid-induced abdominal writhing (<i>in vivo</i>). Formalin, hot plate and tail-flick tests	50, 100 or 150 mg/kg, <i>po</i>	Analgesic	Use of husk fiber tea for pain.	44
Husk fiber	Crude aqueous extract (CE)	Formalin-induced licking and subcutaneous air pouch (<i>in vivo</i>).	10, 50 or 100mg/kg, <i>po</i>	Anti-inflammatory	Use of husk fiber tea for arthritis, diarrhea.	45
Husk fiber	Crude extract (CE) and fractions (F1 e F2)	Rat paw edema test.	AE (50, 100,150 mg/kg), <i>po</i> F1: 1, 10 50 mg/kg), <i>po</i> F2: (1, 10, 50 mg/kg), <i>po</i>	Anti-inflammatory		44
Husk fiber	Liquid extracted from the bark of the green coconut (LBGC) and butanolic extract (BE)	Anthelmintic activity on mouse intestinal nematodes	LBGC (1000-2000 mg/kg), <i>po</i> BE (500-1000 mg/kg), <i>po</i>	Anthelmintic		28
Husk fiber	Crude extract (CE) and fractions (F1-FV)	Reduction of virus titers using TCID50 determinations (<i>in vitro</i>).	500 mg/mL	Antiviral		7
Husk fiber	Crude methanol extract	Trichomonas vaginalis trophozoites were incubated in the presence of the crude extracts in dimethyl sulfoxide (DMSO).	2.5-200 µg /mL	Antitrichomonal	Treatment of disorders of urogenital tract associated with infection by <i>T. vaginalis</i> .	24
Husk fiber	Crude extract (CE) and fractions (F1-FV)	The agar diffusion method (<i>in vitro</i>).	500 mg/mL	Antimicrobial		7
Husk fiber	Crude aqueous extract (CE)	The agar diffusion method (<i>in vitro</i>).	10, 50 or 100 mg/kg	Antimicrobial		45
Husk fiber	Aqueous extract (AE) and extract obtained with n-hexane (EnH)	Microorganism culture on agar;	25 mg/mL	Bacteriostatic or bactericidal		50
Husk fiber	Aqueous extract fractions: A, B and C.	Cytotoxicity against leukemic cells (MTT test).	0, 5, 50 or 500 µg/mL.	Antileukemic		63
Husk fiber	Aqueous extract rich in polyphenols (AEP)	<i>In vivo</i> : culture of parasites promastigotes of <i>L. amazonensis</i> . <i>In vitro</i> <i>L. amazonensis</i> promastigotes was incubated at 26°C for 120 h.	10 and 20 µg/mL of extract, not informed route of administration	Leishmanicidal		33
Husk fiber	Ethyl acetate extract (EAE).	Promastigotes of <i>L. braziliensis</i> were inoculated in the right hind paw of hamsters. Paw edema test, the skin lesions and leukocyte parameters.	300 mg/kg, <i>po</i>	Leishmanicidal		35
Endocarp	Ethanol extract (RNM-1; RNM-2) Oily liquid obtained from the dry distillation (RNDS).	DPPH test. Nitric oxide radical scavenging. Alkaline DMSO method. Determination of total phenolic compounds, total flavonoids and tannins.	Not informed doses or route of administration	Antioxidant		48
Endocarp	Ethanol extracts, dry distilled extract and aqueous extract	Agar diffusion test was performed to evaluate antibacterial activity against <i>S. aureus</i> , <i>P. aeruginosa</i> , <i>K. pneumoniae</i> , <i>E. coli</i> , <i>A. baumannii</i> , <i>Citrobacter freundii</i> , <i>Enterococcus</i> , <i>S. pyrogens</i> , <i>Bacillus subtilis</i> and <i>Micrococcus luteus</i> .	Not informed doses or route of administration	Antimicrobial activity of the endocarp extracts shows strong activity against <i>B. subtilis</i> , <i>P. aeruginosa</i> , <i>S. aureus</i> , <i>M. luteus</i> . Value of MIC was found between 300-350 µg/mL against <i>B. subtilis</i> .		48
Endocarp	Ethanol extract (EE)	<i>In vitro</i> : Aortic rings with and without endothelium. <i>In vivo</i> : Model of hypertension in uninephrectomized male rats with induced salt.	<i>In vitro</i> : 0.25-2 mg/mL <i>In vivo</i> : 300 mg/kg, <i>ip</i>	Antihypertensive	The fruit of <i>Cocos nucifera</i> L. has long been used in folk medicine for the treatment of cardio-	74
Mesocarp	Mesocarp extract (MS)	Agar diffusion test	Not informed doses or route of administration	Antimicrobial	metabolic diseases. In the Indian subcontinent, is used as hydration therapy for cholera, diarrhea and dysentery; addition to the treatment of cancer.	49
Coconut water	Not applicable	Liver injury was induced by CC4. Tests and measurements: Liver enzymes and oxidative stress	6 mL/100 g of body weight. Not informed route of administration	Antioxidant	Used for relief of fever, intestinal disorder. Oral rehydration.	59
Coconut water	Virgin coconut oil (VCO)	Ovariectomized rats	VCO 8% added to the regimen. Not informed route of administration	Anti-osteoporosis		73
Coconut water of four varieties	Not applicable	Cell culture of lung fibroblasts to study the effect of caffeic acid on oxidative stress. DPPH assay, scavenging of nitric oxide, TBARS measurement.	Not informed doses or route of administration	Antioxidant		57
Coconut water	Not applicable	Nephrolithiasis model Wistar rats. Determination of lipid peroxidation, SOD and catalase. Chemical analysis of 24 h urine. Analysis of renal function serum sample. Isolation of total RNA.	Not informed doses or route of administration	Nephroprotective		64
Mature coconut water (MCW)	Not applicable	Alloxan-induced diabetes model in rats. Glucose, insulin and glycated hemoglobin were estimated. Blood urea was calculated. Concentration of urinary nitrate, serum proteins was calculated albumin, TGO and TGP was estimated. Serum creatinine and nitric oxide synthase (NOS) activity were estimated.	4 mL/100 g, intragastric.	Reverses the increase in the concentration of urea, creatinine and serum nitrite. Animals receiving MCW + glibenclamide showed increased NOS activity in the liver, as well as increased plasma concentration of L-arginine.		71
Albumen solid	Crude methanol extract (CME)	Animal model of malaria	50, 100, 200 and 400 mg/kg, <i>po</i>	Antiparasitic	Treat malaria, fever, taeniasis, schistosomiasis and ancylostomiasis.	25
Protein of albumen solid coconut (CAP)	Not applicable	Hypercholesterolemic rats	80 g CAP/kg diet. Not informed route of administration	Hypolipidemic and anti-peroxidative		61
Fresh roots	Ethanol extract of <i>C. nucifera</i> (EECN)	Acetic acid-induced abdominal writhing. Hot plate test.	40, 60 or 80 mg/kg, <i>ip</i>	Analgesic		41
Fresh roots	Ethanol extract of <i>C. nucifera</i> (EECN)	Pentylenetetrazole-induced seizures model	25-80 mg/kg, <i>ip</i>	Anticonvulsant		41
Fresh roots	Ethanol extract of <i>C. nucifera</i> (EECN)	Test induced sleep pentobarbital, meprobamate and diazepam in mice.	40, 60 or 80 mg/kg, <i>ip</i>	Potential of pentobarbital-induced sleep.		41

MIC: minimum inhibitory concentration; DMSO: dimethyl sulfoxide; NOS: nitric oxide synthase; *ip*: intraperitoneal route; *po*: oral route.

Click to view the fully enlarged versions of the table here
(http://bjournal.com.br/supplementary_material/4773.pdf).

In support of these findings, the GreenMedInfo.com database presently contains research on the coconut palm's potential therapeutic value in preventing and/or treating over **50 different conditions**, and expressing 16 different beneficial biological effects. You can view the supporting studies on our **coconut research page (/substance/coconut)**.



The new study, titled "**Cocos (http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0100-879X2015005054773&lng=en&nrm=iso&tling=en) nucifera (L.) (Arecaceae): A phytochemical and pharmacological review (http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0100-879X2015005054773&lng=en&nrm=iso&tling=en),"** also reviewed the toxicity literature on the coconut palm's various constituents and found there was no evidence of acute toxicity, and only low toxicity associated with chronic exposure.

The study summarized the story of the coconut palm's fascinating spread around the world as follows:

The plant is originally from Southeast Asia (Malaysia, Indonesia, and the Philippines) and the islands between the Indian and Pacific Oceans. From that region, the fruit of the coconut palm is believed to have been brought to India and then to East Africa. After the discovery of the Cape of Good Hope, this plant was introduced into West Africa and, from there, dispersed to the American continent and to other tropical regions of the globe."

The review also summarized the traditional healing applications of the coconut palm. This is an important, complementary data set, because though many of the traditional uses have not yet been tested and validated by science, they may actually work exceptionally well for these conditions in actual practice. Below is a table showing many of these traditional uses:

Table 2. Traditional uses of *Cocos nucifera* to treat different diseases.

Coconut parts	Preparation	Popular use	Country	References
Coconut shell fiber	Tea	Diarrhea treatment	Brazil	7
		Amenorrhea	Haiti	13
	Extract	Venereal diseases treatment	Trinidad	23
		Antipyretic, kidney inflammation	Guatemala	12
		Diuretics, gonorrhea treatment	Peru	22
		Urogenital inflammation caused by <i>Trichomonas vaginalis</i>	Mexico	24
		Amenorrhea, dysmenorrhea	Trinidad	23
		Diabetes treatment	Jamaica	19,20
		Asthma treatment	Haiti, Peru	14,22
		Cream	Abscesses, dermatitis treatment and injuries	Guatemala
Root	Tea	Burns	Haiti	13
		Diarrhea and stomach pains	Papua New Guinea	8,9
Solid albumen (pulp) of coconut	Extract	Antipyretic, diarrhea treatment	Indonesia	16
	Oil	Preventing hair loss, wound healing	Fiji, Indonesia	10,17
	Milk	Diarrhea treatment	Ghana	11
		Oral contraceptive	Indonesia	18
	Pulp	Aphrodisiac	Mozambique	21
		Relief to rashes caused by HIV-AIDS infections	Kenya	26
Coconut water	Decoction of the pulp	Treatment of fever and malaria	Malaysia	25
	Water	Treatment of renal diseases	Fiji	10
Inflorescence	Tea	Treatment of changes in the menstrual cycle	India	15

The traditional uses were also summarized in the following paragraph:

In Brazil, extract from the husk fiber of *C. nucifera* is used to treat diarrhea (7). In Papua New Guinea, the leaves and roots of young plants are chewed as treatment for diarrhea and stomachaches (8,9). In Fiji, coconut oil is used to prevent hair loss and coconut water is used to treat renal disease (10). In Ghana, people use coconut milk to treat diarrhea (11). In Guatemala, the husk fiber extract is used as an antipyretic, to reduce renal inflammation, and as a topic ointment for dermatitis, abscesses, and injuries (12). In Haiti, a decoction of the dry pericarp is used for oral treatment of amenorrhea, and the oil is applied as an ointment to burns (13); an aqueous extract from the husk fiber is also used for oral asthma treatment (14). In India, infusions made with the coconut inflorescence are used for the oral treatment of menstrual cycle disorders (15). In Indonesia, the oil is used as a wound ointment, the coconut milk is used as an oral contraceptive, and fever and diarrhea are treated with the root extract (16–18). In Jamaica, the husk fiber extract is used to treat diabetes (19,20). In Mozambique, the fruit is consumed by men as an aphrodisiac (21). Peruvians use the aqueous extract of the fresh coconut fiber orally for asthma, as a diuretic, and for gonorrhoea (22). In Trinidad, bark extract is used orally for amenorrhoea and dysmenorrhoea, and bark tea is used to treat venereal diseases (23). In Mexico, coconut is used to treat various disorders associated with urogenital tract infection by *Trichomonas vaginalis* (24). A decoction of the white flesh of the fruit is used in rural Malaysia to treat fever and malaria (25). In Kenya, the fruit is used to relieve skin rash caused by HIV infection (26).

The study concluded,

Cocos nucifera is a widely dispersed plant that has important pharmacological effects with low toxicity. Furthermore, medicinal use of *C. nucifera* has an environmental appeal, since this plant is widely used in the food industry and use of discarded plant parts will reduce waste and pollution. The pharmacological effects of the plant differ according to the part of the plant or fruit used. Antioxidant activity predominated in the constituents of the endocarp and coconut water. In addition, the fiber showed antibacterial, antiparasitic, and anti-inflammatory activities. Only the ethanolic extract of the root had depressant and anticonvulsant action on the central nervous system. Coconut water seems to have protective effects, e.g., on the kidney and heart, and antioxidant activity, as well as a hypoglycemic effect.

For more information on the amazing properties of coconut, read the following popular articles on the topic:

- **13 Evidence-Based Medicinal Properties of Coconut Oil** (</blog/13-evidence-based-medicinal-properties-coconut-oil>)
- **Coconut Oil Pulling Superior to Chemicals for Oral Health** (</blog/coconut-oil-pulling-superior-chemicals-oral-health>)
- **How Coconut Oil May Rescue The Brain From Alzheimer's** (</blog/how-coconut-oil-may-rescue-brain-alzheimers-disease>)
- **Coconut Water: A New Alzheimer's Disease Treatment** (</blog/coconut-water-new-alzheimers-disease-treatment>)
- **Only 1 TBSP of Coconut Oil Produces Powerful Health Changes** (</blog/only-1-tbsp-coconut-oil-produces-powerful-health-changes-study-confirms>)
- **Coconut Oil May Reduce White Rice Calories 50%** (https://disqus.com/home/discussion/greenmedinfo/coconut_oil_may_reduce_white_rice_calories_50_60/)
- **MCT Fats Found In Coconut Oil Boost Brain Function In Only One Dose** (<http://wakeup-world.com/2013/04/16/mct-fats-found-in-coconut-oil-boost-brain-function-in-only-one-dose/>)



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