

**PHARMACOLOGICAL PROPERTIES OF
EURYCOMA LONGIFOLIA—A REVIEW**

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Summary

The present review describes the morphological, phytochemical and pharmacology aspects of *Eurycoma longifolia* (Simaroubaceae). *Eurycoma longifolia* popularly known as tongkat ali or pasak bumi is a traditional herb used widely in countries like China, India and Malaysia as a libido enhancer. *Eurycoma longifolia* has become popular for its alleged testosterone-enhancing properties. It has therefore been included in some herbal supplements for bodybuilders. Historically, South East Asia has utilised the herb for its suggested antimalarial, antibacterial activity, antipyretic, antiulcer, antitumor, cytotoxic, and aphrodisiac properties. So, in this article we are going to discuss about its benefits and an overview of phytochemical and pharmacological profiles.

Keywords: *Eurycoma longifolia*; Pharmacognosy; Phytochemistry; Pharmacological profile.

Introduction

E. longifolia is commonly known as Tongkat Ali (Malaysia), Pasak bumi (Indonesia), Cay Ba Binh (tree that cures hundred of diseases), and Malaysian ginseng.¹ It is a tall, slender shrubby tree found on sandy soil. The plant is indigenous to Southeast Asia, including Myanmar, Thailand, Laos, Cambodia, and Malaysia^{2,3}. A decoction of the roots, root bark, or bark is consumed by mouth to treat numerous conditions, including diarrhea, fever, glandular swelling, bleeding, dropsy, persistent cough, hypertension, relief of pain in the bones, and tertian malaria. The bark also has been used topically to treat wounds, ulcers, syphilitic sores, and headache. The plant is primarily known in commerce for its aphrodisiac properties⁴.



Fig.: *Eurycoma longifolia*

The part of the tree used for sexual effects is the root. The habitats of *Eurycoma longifolia* Jack, a slender tree, are jungles in Malaysia and Indonesia.

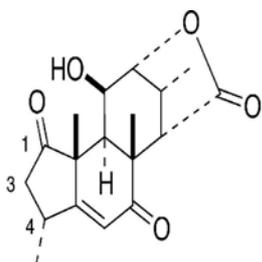
Plant is commonly known as Tongkat Ali, this herb is used in the United States mainly for its aphrodisiac properties. You will find this herb and its extracts either sold by itself as a supplement, or combined in herbal formulas promoted for sexual enhancement. *E. longifolia* is an effective aphrodisiac and is found in various natural aphrodisiac products on the market, including an excellent and effective physician formulated product called Passion Rx with Yohimbe.

MORPHOLOGY

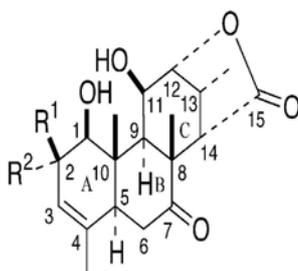
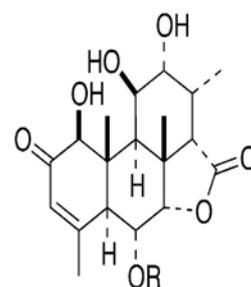
Eurycoma longifolia is a small everred treelet growing to 15 m (49 ft) tall, with spirally arranged, pinnate leaves 20-40 cm (8-16inches) long with 13-41 leaflets. The flowers are dioecious, with male and female flowers on different trees; they are produced in large panicles, each flower with 5-6 very small petals. The fruit is green ripening dark red, 1-2 cm long and 0.5-1 cm broad⁵.

PHYTOCHEMISTRY

There are numerous reviews and phytochemical studies on *E. longifolia*. The plant's pharmacological activity is attributed to various quassinoids, squalene derivatives, biphenylneolignans, tirucallane-type triterpenes, canthine-6-1, and beta-carboline alkaloids⁶. Quassinoids, including eurycomanol, eurycomanol-2-O- β -D-glycopyranoside, 13 β , 18-dihydroeurycomanol, 14, 15 p-dihydroxyklaineaneone, and 6 α -hydroxyeurycomalactone, have been isolated from the roots. Pasakbumin A-D (also known as eurycomanones) has been isolated⁷⁻¹⁰. Squalene derivatives include eurylene, 14-deacetyl eurylene, longilene peroxide, and teurilene¹¹⁻¹².



1: Eurycolactone D

4: Laurycolactone B ($\Delta^{3,4}$)2: Eurycolactone E ($R^1 = H, R^2 = OH$)5: Eurycomalactone ($R^1, R^2 = O$)3: Eurycolactone F ($R = Ac$)6: Longilactone ($R = H$)

Biphenylneolignans include the following: 2 isomeric 2,2-dimethoxy-4-(3-hydroxy-1-propenyl)-4-(1,2,3-trihydroxypropyl) diphenyl ethers and 2 biphenyls, 2-hydroxy-3, 2, 6-trimethoxy-4-(2,3-epoxy-1-hydroxypropyl)-5-(3-hydroxy-1-propenyl)-biphenyl and 2-hydroxy-3,2-dimethoxy-4-(2,3-epoxy-1-hydroxypropyl)-5-(3-hydroxy-1-propenyl)-biphenyl¹³. Alkaloids include 9, 10-dimethoxycanthin-6-one, 10-hydroxy-9-methoxycanthin-6-one, 11-hydroxy-10-methoxycanthin-6-one, 5, 9-dimethoxycanthin-6-one and 9-methoxy-3-methylcanthin-5,6-dione¹⁴⁻¹⁵.

PHARMACOLOGICAL ACTIVITIES

Aphrodisiac activity:

The plant is primarily known in commerce for its aphrodisiac properties. The root extracts of *E. longifolia* has gained wide recognition for its unique feature of enhancing the virility and sexual prowess, when the prepared decoction is taken internally. Even though traditionally, this plant has gained wide popularity for its aphrodisiac activities, when it comes to the consumers it is a necessity to validate the same and clear it "as safe for human consumption". Root powder extract of *Eurycoma longifolia* is able to improve the copulatory performance of sexually sluggish rats following acute or subacute administration¹⁶.

Antimalarial activity:

The *n*-butanol extract of *Eurycoma longifolia* roots displayed higher antimalarial activity of 0.34 g/ml than its diethyl ether extract of 1.50 g/ml, both these extracts were more potent than chloroquine diphosphate (2.50 g/ml) against the Gombak A isolate of *Plasmodium falciparum*¹⁷.

Anticancer activity:

Several reports are available on the possible inhibitory of cancer by the extracts of *E. longifolia*. The quassinoids isolated from *E. longifolia* have been studied for their in vitro cytotoxicities against KB cells derived from human epidermoid carcinoma of the nasopharynx¹⁸. A new squalene - type triterpene, named eurylene, isolated from *E. longifolia* which were found to be cytotoxic¹⁹. A new C quassinoid 6 a-hydroxy eurycomalactone isolated from the roots of *E. longifolia* and has reported that the cytotoxic activity of the quassinoids from this plant was not mediated through DNA cleaving properties²⁰.

Antidiabetic activity:

The aqueous extracts (50, 100 and 150 mg/kg BW) of freeze dried and spray dried samples of *E. longifolia* to determine the blood glucose lowering effect in normoglycaemic and Streptozotocin-induced hyperglycaemic rats. From the results obtained, the administration of freeze dried and spray dried aqueous extracts revealed positive results in hyperglycaemic rats and was high at a concentration of 150 mg/kg BW of the aqueous extract was used. However, it was observed that in the normoglycaemic rats, no significant reduction to occur after administering the extracts²¹.

Antimicrobial activity:

The extracts of leaves and stems were active on both Gram positive and Gram negative bacteria, except for the 2 strains of Gram negative bacteria (*Escherichia coli* and *Salmonella typhi*). Study also revealed that aqueous leaves extract to possess antibacterial activity against *Staphylococcus aureus* and *Serratia marscesens*. However, surprisingly the root extracts did not show any antibacterial activity²².

Conclusion

The multiple benefits of *Eurycoma longifolia* made it a true miracle of nature. Few studies have been conducted on different parts of *Eurycoma longifolia*, but this plant has not yet developed as a drug by pharmaceutical industries. In view of the nature of the plant, more research work can be done on humans so that a drug with multifarious effects will be available in the future market.

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