

Short Communication: Plants used as aphrodisiacs by the Dayak ethnic groups in Central Kalimantan, Indonesia

FAUZI*, HARTO WIDODO

Center for Research and Development of Medicinal Plants and Traditional Medicine. Jl. Raya Lawu No.11 Tawangmangu, Karanganyar 57792, Central Java, Indonesia. Tel.: +62-271-697010, Fax.: +62-271-697451, *email: fauzi.b2p2to2t@gmail.com

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Abstract. Fauzi, Widodo H. 2019. Short Communication: Aphrodisiac plants used by Dayak Ethnic in Central Kalimantan Province, Indonesia. *Biodiversitas* 20: 1859-1865. Sexual dysfunction in men might render psychological disorders and household harmony. The prevalence increases with age and other risk factors such as systemic diseases and psychological factors. A community with no exception certain ethnic groups uses plants to fulfill various needs, including to treat sexual disorders in men. This paper aims to explore medicinal plants that are often used for aphrodisiacs by Dayak ethnic in Central Kalimantan Province, Indonesia. The method was carried out through reviewing literature, searching for various references and analyzing data of the exploration of ethnomedicine and community-based medicinal plants in Indonesia held in 2012 and 2015. Of the 9 Dayak ethnic groups surveyed, only four ethnic groups (Bawo, Taboyan, Tomum dan Siang) possess an aphrodisiac formula. The plants used by ethnic Dayaks for aphrodisiacs are *Eurycoma longifolia* Jack., *Luvunga sarmentosa* (Bl.) Kurz., *Rennellia elliptica* Korth., *Mimosa pudica* L., *Lepisanthes amoena* (Hassk) Leenh., *Fordia splendidissima* (Miq.) Buijsen., *Imperata cylindrica* (L.) Raeusch., *Ficus deltoidea* Jack., *Koiloclepeas bantamense* Hassk., *Eusideroxylon zwageri* Teijsm. & Binn., *Gnetum* sp., *Caryota* sp. and *Calamus* sp.

Keywords: Aphrodisiac plants, Central Kalimantan, Dayak ethnic

INTRODUCTION

The word 'aphrodisiac' comes from Aphrodite, the goddess of beauty, love, and sex in Greek mythology. The aphrodisiac is all medicinal ingredients and foods that can arouse sexual desire (Pallavi et al. 2011). Male sexual dysfunction includes sex drive disturbances, erectile problems, ejaculatory dysfunctions, and orgasm disorders. Sexual intercourse, often used as an indicator of household happiness, is fundamental to the human being and it increases the harmonious relationship between husband and wife. Sexual disorders might drive to depression, stress, and infertility (Fisher and Hammarberg 2012). Proper sexual function is also a crucial component in maintaining a satisfying intimate relationship and self-esteem (Jayusman et al. 2017). For most men, a good performance in sexual activities will increase self-esteem, while failure in giving sexual satisfaction to the partner is disappointing and embarrassing, so they try to improve their sexual power.

Sexual dysfunction is also common in men with a history of systemic diseases such as diabetes mellitus (DM) and hypertension (Pradana 2015), vascular diseases, hormonal disorders, post prostate surgery, nerve damage due to other diseases, and psychological factors such as stress, anxiety, depression, fatigue, strife, and pain (Ghofar and Ashari 2010). Erectile function in men is the result of complex interactions between vascular, nerve, hormonal and psychological factors (Sasube and Rampengan 2016).

The prevalence of degenerative diseases such as DM, hypertension, and even psychiatric problems is increasing in Indonesia from year to year (Balitbangkes 2018). This indicates that the prevalence of sexual dysfunction in men has also increased proportionately. According to Mulhall et al. (2016), the prevalence of erectile dysfunction in men also increases significantly with age. The total population of the world experiencing sexual dysfunction was around 152 million in 1995, and it would be 322 million in 2025 (Ayta et al. 1999).

In traditional Ayurvedic medicine of India, the treatment of sexuality has a special branch which is called Vijakarna. It is defined as a therapy to get a sexual drive and energy like a horse's power of passion (Prosanta et al. 2015).

As the second mega-biodiversity country in the world, Indonesia has many plants which have aphrodisiac properties. In addition, Indonesia is also rich diversity of ethnicities in line with the heterogeneous local wisdom in utilizing plants for traditional medicine (Balitbangkes 2015), both of these potential assets for developing aphrodisiac drugs. In the past, people relied on traditional medicines for treating almost all types of health problems because of the remoteness and geographical isolation of living areas. Additionally, there was generally no access to formal and modern healthcare service personnel such as medical doctors.

Dayak tribes in Central Kalimantan are familiar with a traditional medicinal system called "obat kampung" which

is inherited over generations whereas their medical practitioners are called *tabit* or *lasang* (Asmawati et al. 2018). The wisdom of Dayak ethnic in Central Kalimantan about the use of plants as aphrodisiacs is notable to discuss since the practice has a long history as it was evolved before conventional medicine was developed. People prefer traditional medicines derived from plants than modern drugs as aphrodisiacs not only due to more available and less costly but also a fewer side effect, furthermore, a high incidence of adverse effects of modern drugs which even worsen sexual dysfunction in the long run (Kotta et al. 2013).

This article is a report of traditional knowledge of plants as aphrodisiacs by the Dayak ethnic in Central Kalimantan, Indonesia which can provide basic information for the development of safe and effective traditional medicines which can be also used as a reference for future advanced research in this field.

MATERIALS AND METHODS

Study area and period

Data obtained from national research called "Exploration of Ethnomedicinal Local Knowledge and Community-based Medicinal Plants in Indonesia" conducted in 2012 and 2015 which was locally known as *Riset Tumbuhan Obat dan Jamu* (RISTOJA) were used in this study. A part of the research was held in Central Kalimantan Province, Indonesia where Dayak ethnic groups live.

Sampling and data collection

The independent variable was the traditional healers belonging to Dayak Ethnic groups. Ethnic groups such as Dayak Bakumpai, Dayak Bawo, Dayak Maayan, Dayak Ngaju, Dayak Taboyan, Dayak Tomum, Dayak Sampit, Dayak Siang, and Dayak Udd Danum have a population of more than 1,000 people and living in the place of origin (motherland) were employed in this research based on data of the Central Bureau of Statistics (BPS 2018). Each group involved five traditional healers as informants who were identified using purposive sampling method.

Desired information such as respondents characteristics, detail of treatments (plant ingredients, method of drug preparation, and treatment process), data regarding locations from where plants were collected, and other wisdom related to utilizing plants for medication were collected and compiled using questionnaire-based interviews. This study discusses only information about the use of plants as aphrodisiacs which is further reviewed with the help of various available literature such as articles and scientific publications.

Species identification

Identification of plant species was carried out by RISTOJA team and confirmed by botanists from several Indonesian Universities, based on herbarium materials and photographs of medicinal plants collected from the areas of their growth.

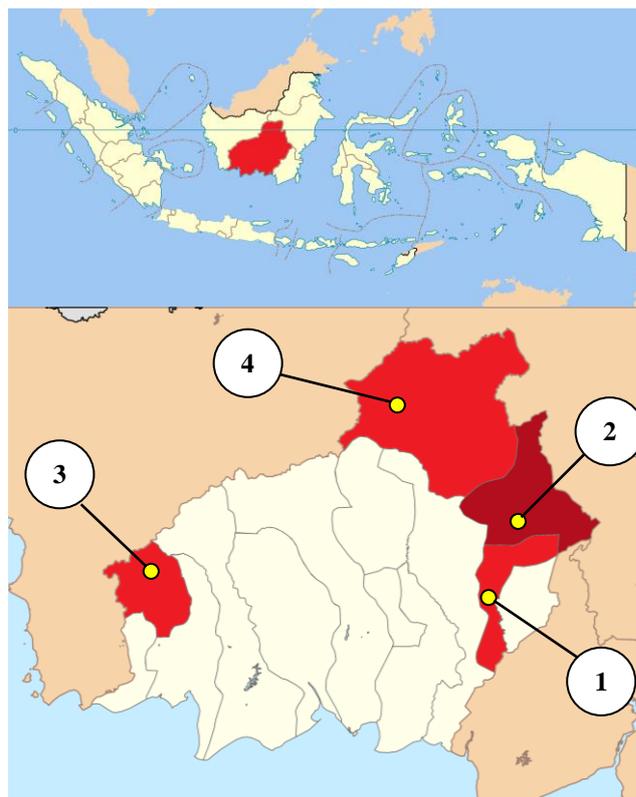


Figure 1. Map of the study area showing the distribution of Dayak Ethnic groups who use plants as aphrodisiacs. Note: 1. Bawo Dayak of South Barito District (4 potions; 4 species), 2. Taboyan Dayak of North Barito District (4 potions; 6 species), 3. Tomum Dayak of Lamandau District (2 potions; 4 species), and 4. Siang Dayak of Murung Raya District (2 potions; 4 species)

RESULTS AND DISCUSSION

According to RISTOJA data, only four out of nine ethnic groups of Dayak living in Central Kalimantan Province possessed information regarding the use of aphrodisiacs employing plants as the main ingredient. These four groups were Bawo, Taboyan, Tomum and Siang (Figure 1). Only a few plant species were revealed as aphrodisiacs and the frequency of their use was relatively less and rare. Though, in general, the prevalence of sexual disorders in man is more than 50% (Phillip and Khan 2010), in many communities of Indonesia the sexual issues are still considered a taboo which is embarrassing for the victims, they are therefore reluctant to discuss such problems even for getting a treatment (Muhalla 2011). So, traditional healers rarely possess information about aphrodisiacs. It was found that only 13 medicinal plants were used for this purpose, out of which 10 have been identified till the level of species and the remaining three were identified only to the level of genus.

Most of the plants used by Dayaks grow wild in forests or in garden areas around their domicile. A medical tradition of a society is related to its local culture and relationship of people with their environment. Perception about the concept of sickness, health and the preferred plant species used as traditional medicine is formed

through a socialization process spanning over many generations, that is trusted and believed as an axiom (Rahayu et al. 2006).

The utilization of plants as aphrodisiac consists of two motives, single plant and a combination of several plants in the form of mixtures by soaking or boiling with water and then drunk. Out of the 12 recorded methods of treatment, eight were using a single plant as ingredient whereas four were using a combination of several plants (Table 1). The mixing of two or more plant materials and even non-plant substances may be intended to improve the effectiveness when the use of a single plant has not met with the desired effect.

Instead of the leaves, the aphrodisiac preparations mostly used roots and stems as ingredients. Dayak ethnic herbalists applied *ikan talan* (and male squirrels as additional ingredients which aim to increase the body's nutritional intake. According to Prosanta et al. (2015), the aphrodisiac materials can also be intended to refresh the body, elevate nutritional status, enrich the essential oils in order to affect the neuromuscular system and facilitate blood circulation.

Plants used as aphrodisiacs

Saluang belum (*Luvunga sarmentosa*)

Saluang belum (*L. sarmentosa*) is one of the endemic plants of Borneo, often used by local ethnic groups to increase male vitality. Wati et al. (2018) state that the ethanolic extract of *L. sarmentosa* increased the number of spermatocytes and spermatid cells and showed aphrodisiac activity in male albino Wistar rats. Administration of 70% ethanolic extract of roots of *L. sarmentosa* increased the number of spermatocyte and spermatid cells and did not show any changes in the testicular histopathology, which indicated an increase of male fertility (Musfirah et al. 2016a). The administration of *L. sarmentosa* root ethanolic extract increased the quantity and quality (motility and viability) of mice sperms (Musfirah et al. 2016b).

Luvunga sarmentosa contains flavonoids, steroids, and tannins, which are closely related to the aphrodisiac activity. Flavonoids improve cement quality and inhibit the activity of phosphodiesterase which affects the sexual behavior of male rats. Steroids are hormones that can increase dehydroepiandrosterone and affect sexual behavior (Wati et al. 2018).

Table 1. Plants and preparation methods of aphrodisiac potion by Dayak ethnic groups in Central Kalimantan, Indonesia

Ethnic group	Local name	Botanical name	Family	Preparation
Bawo Dayak	Akar rahwana	<i>Calamus</i> sp.	Arecaceae	The roots are cleaned, soaked in boiled water for a day, then the water is drunk
	Saluang belum	<i>Luvunga sarmentosa</i> (Bl.) Kurz	Rutaceae	The stem is cut into pieces, soaked in boiled water and the water is drunk
	Pasak bumi	<i>Eurycoma longifolia</i> Jack	Simaroubaceae	The roots are cut, cleaned and soaked in boiled water and then drunk.
	Ginseng Borneo	<i>Rennellia elliptica</i> Korth.	Rubiaceae	The roots are cut into pieces, soaked in warm water, then the water is drunk.
Taboyan Dayak	Seluang belum	<i>L. sarmentosa</i>	Rutaceae	The root of seluang belum, the stem of pasak bumi and root of ginseng boneo are soaked in boiled water and the water is drunk.
	Pasak bumi	<i>E. longifolia</i>	Simaroubaceae	
	Ginseng Borneo	<i>R. elliptica</i>	Rubiaceae	Borneo ginseng root soaked in boiled water and drunk
	Ginseng Borneo	<i>R. elliptica</i>	Rubiaceae	
	Putri malu	<i>Mimosa pudica</i> L.	Leguminosae	Leaves boiled with water and drunk.
	Selegigian hiang merah	<i>Lepisanthes amoena</i> (Hassk) Leenh.	Sapindaceae	The root of selegigian hiang merah and selegigian hiang putih soaked in water and used as a drink.
Selegigian hiang putih	<i>Fordia splendidissima</i> (Miq.) Buijzen	Leguminosae		
Tomum Dayak	Saluang belum	<i>L. sarmentosa</i>	Rutaceae	Root boiled with water, filtered and drunk.
	Ilalang	<i>Imperata cylindrica</i> (L.) Raeusch.	Poaceae	Stolon of ilalang, root of pasak bumi, male squirrel, ikan telan, barito root, and bark of saluang belum boiled with water and then drunk.
	Pasak bumi	<i>E. longifolia</i>	Simaroubaceae	
	Tupai jantan	Non-plant material		
	Ikan telan	Non-plant material		
	Tabat barito	<i>Ficus deltoidea</i> Jack	Moraceae	
	Saluang belum	<i>L. sarmentosa</i>	Rutaceae	
Siang Dayak	Kayu pantak	<i>Gnetum</i> sp.	Gnetaceae	Kayu pantak is infused in warm water for 10-12 hours, then drunk.
	Gading	<i>Koiloceras bantamense</i> Hassk.	Euphorbiaceae	The root of gading, tabalio and uwei ahas were soaked in hot water for 10-12 hours then use the water as a drink.
	Tabalio	<i>Eusideroxylon zwageri</i> Teijsm. & Binn.	Lauraceae	
	Uwei ahas	<i>Caryota</i> sp.	Arecaceae	

Pasak bumi (*Eurycoma longifolia*)

Pasak bumi (*E. longifolia*) a herb found in South-East Asia has been widely used in traditional medicine. The plant belongs to the Simaroubaceae family and is known locally as 'Tongkat Ali' or 'Pasak Bumi' in Malaysia and Indonesia. *Pasak bumi* contains numerous types of compounds such as quassinoids, triterpenes, coumarins, anthraquinone, flavonoid and many other secondary metabolites (Abubakar et al. 2017).

Water soluble extracts can overcome further hypogonadism and other related disorders (Adewoyin et al. 2017). *E. longifolia* extract acts as a potential agent for reversing the effects of estrogen by increasing spermatogenesis and sperm counts in rats after fourteen consecutive days of treatment (Wahab 2010). Zanolina et al. (2009) stated that *E. longifolia* root improved sexual performance but not motivation in sluggish rats after acute or subacute administration. The effect could be mainly ascribed to increased testosterone levels. Eurypeptides compounds of *pasak bumi* can stimulate the biosynthesis of various androgens (Tambi et al. 2012).

The extract of the *pasak bumi* root increased the concentration of testosterone and sperm, and the vitality and progressive motility of sperm. Administration of up to 800 mg/kg ww did not change the histopathology of the prostate, testicle, and epididymis (Solomon et al. 2013). Moreover, a Randomized Clinical Trial has revealed that water extract of *pasak bumi* root significantly improved Physical Functioning of SF-36 and showed the improvement of erectile function, sexual libido, sperm motility, and semen volume (Ismail et al. 2012).

Ginseng borneo (*Rennellia elliptica*)

Previously known as *R. elongata*, it is a tall shrub of about 1-2 m, the leaves are rather narrow and round with a tapered tip and rough surface. Terminal inflorescence, purple flowers, *R. elliptica* including the Rubiaceae family which grows along the rivers banks and forests at an altitude of 40-650 m asl., is a native plant of Southeast Asia which is widely distributed in Peninsular Malaysia, Southern Thailand and Indonesia. The plant is traditionally used for the treatment of jaundice, body aches, as a tonic and aphrodisiac (Ismail et al. 2012)

Rennellia elliptica root contains anthraquinone, triterpenoid lactone, coumarin, and phenolic acid. The root methanolic extract has an antiplasmodial activity while the dichloromethane extract acts as an antioxidant that is stronger than quercetin. In Malaysia, the root decoction also used as a treatment for body pain, as a postpartum tonic, aphrodisiac and in jaundice treatment (Osman and Ismail 2017).

Putri malu (*Mimosa pudica*)

Putri malu (*M. pudica*) contains mimosine, pipercolinic acid, tannins, alkaloids, saponins, triterpenoids, sterols, polyphenols and flavonoids. *Putri malu* has pharmacological activities such as antidiabetic, antitoxin, antihepatotoxic, antioxidant and wound healing (Azmi et al. 2011). Roots and leaves are used as astringent, diuretic; in constipation, fever, boils, dysentery, inflammation,

burning, hemorrhoids, asthma, smallpox, and as an aphrodisiac. Ethanolic extract of the root with doses of 500 mg/kg increase libido and testosterone levels in male mice without side effects (Pande and Pathak 2009). *M. pudica* has protective and restorative activities of cadmium damaged reproductive organs (testicles) in mice (Onyije et al. 2018).

The pharmacological activities of the plants which only identified up to the genus level in the present study are *Akar rahwana* (*Calamus* sp.), *Kayu pantak* (*Gnetum* sp.) and *dan Uwei ahas* (*Caryota* sp.). However, there is a belief that plants belonging to the same genus or even the same family have similar chemical constituents so that they may have similar biological activities (Ntie-kang et al. 2013).

Calamus is the largest genus of Aracaceae, having 83 species in the island of Borneo (Baker and Dransfield 2014). It is an edible plant and in Ayurveda is said to have medicinal benefits including curing fever, hemorrhoids, dyspepsia, and various digestive disorders (Thakur et al. 2016). The root is efficacious as an aphrodisiac (Bird 1960). Phytochemical screening revealed that *Calamus tenuis* contained saponins, flavonoids, steroids, tannins, and glycosides (Chauhan et al. 2014). Saponins, flavonoids, alkaloids, and steroids are compounds that are responsible for aphrodisiac properties of various reputable plants which have been known for their aphrodisiac use (Kotta et al. 2013)

The genus *Gnetum* contains a variety of bioactive compounds, such as flavonoids and stilbenoids which possess blood pressure-lowering, antioxidant, anticancer, and antibacterial activities (Jiang et al. 2016). One of the stilbenoid compounds from *G. gnemon*, *trans-resveratrol*, is capable to prevent endothelial damage and aging (Barua et al. 2015), Endothelial dysfunction and vascular disease are among the main causes of erectile problems (Sasube and Rampengan 2016).

The plant genus *Caryota* was reported to contain triterpenoids, steroids, flavonoids, alkaloids, saponins, tannins, and fatty acids (Charles 2011). *Caryota mitis* contain kaempferol, chlorogenic acid, β -amyryn, β -sitosterol and quercetin, traditionally used for medication including treatment of loss of virility in men (Abdelhakim et al. 2017).

Selegin hiang merah (*Lepisanthes amoena*)

Selegin hiang merah (*L. amoena*) belongs to the family of Sapindaceae and is a wild plant around the village and in the forests. This plant is known as *slow loris* or *selekep* (East Kalimantan), *langir* (West Java) and *rembia* (South Kalimantan). *Loris* leaves are used as a mixture of traditional cosmetics (Salusu et al. 2017). *Kutai* tribe and the *Tunjung Dayak* tribe in East Kalimantan used the plant empirically to deal with various skin problems including removing black spots on the face, healing smallpox and acne scars (Batubara et al. 2010). This plant has the potential as an antioxidant agent with a relatively small IC50 value. Infertility in men generally correlates with high reactive oxygen species (ROS), pro-inflammatory cytokines and invasion of leukocytes in

sperm. Antioxidants provide a very important defense against male infertility due to free radicals (Adewoyin et al. 2017)

Selegigin hiang putih (*Fordia splendidissima*)

Selegigin hiang putih (*F. splendidissima*), belonging to Sladeniaceae family, is a tree reaching about 13 m, compound leaves and pink-purple flowers. It grows in Kalimantan forests on hills and mountains to an altitude of 3,500 m asl. It contains phenolic compounds, flavonoids, tannins, steroids, and saponins. This plant is used in wound healing remedies and postpartum mixtures by the Dayak Benuaq (Falah et al. 2013). Saponin and steroid compounds enable to increase the blood testosterone (Chauhan et al. 2014), whereas phenolic and flavonoid compounds are reputable antioxidants that are capable of preventing degenerative disorder related oxidative stress.

Ilalang (*Imperata cylindrica*)

Ilalang (*I. cylindrica*), or better known as 'alang-alang' in Indonesia, is considered as a weed and spread almost all over the hemisphere. It is native to China, Japan, Philippine, Southeast Asia, and Australia (Hidayat and Rochmadiyanto 2017). *I. cylindrica* is recorded for treating several health problems in Ayurveda and Traditional Chinese Medicine (Simha 2012). The rhizome mainly contains phenolic compounds such as flavonoids, simple phenols, phenolic acids, coumarins, and lignans (Rong-hua et al. 2013), steroids and glycosides (Jayalakshmi et al. 2010).

The root has been used for treating various ailments viz. urinary calculi, retention of urine, cardiac disorder, gout, common cough and cold, menorrhagia, inflammation, burning sensation, fever, and anemia, and as an aphrodisiac, and rejuvenator (Jayalakshmi et al. 2010). The prescribed conventional diuretic and antihypertensive medications might impair sexual function in man (Fogari et al. 1998). Natural medicine, especially plant-based medication, is believed to have less negative side effects and are better in enhancing the holistic body system. Therefore, plants with diuretic and antihypertensive properties which also have aphrodisiac effects are highly preferable.

Tabat barito (*Ficus deltoidea*)

Tabat barito (*F. deltoidea*) is a ecotonous plant that can live optimally in the transition area of two ecosystems. Spread in several regions of Indonesia such as Sumatra, West Java, Kalimantan, and Sulawesi, at an altitude of 450-2,400 m asl. Generally, they live as epiphytic plants in forests. Barito contains flavonoids, steroids, alkaloids and triterpenoids (Kurz and Constabel 1998). The metabolites found in the figs are shikimic acid, decanal aliphatics, monoterpenes, and high numbers of sesquiterpenes, whereas the leaves rich in flavonoids (Bunawan et al. 2014).

People traditionally use this plant for preventing and curing of number health problems, i.e: wounds, rheumatism, sores, after-birth tonic to contract the uterus and vaginal muscles, menstrual cycle disorders,

leucorrhoea, diabetic (Bunawan et al. 2014) and hypertension (Radjeni et al. 2017). Diabetes and high blood pressure are risk factors of the occurrence of sexual disorders in men (Javaroni and Neves 2012). Improvements from these risk factors will increase body fitness regardless of sexual activity. This plant tends to be more widely used by communities as woman aphrodisiac, to dealing with female reproductive problems such as accelerating menstruation, vaginal discharge, and tightening the uterus after delivery (Musa 2006). The decreasing of testes and epididymis weight, sperm count and viability of the treated animal using leaf extract has been reported, otherwise, a significant increase in epididymis weight, a number and sperm count and viability of rats treated with stem extract has been revealed (Bunawan et al. 2014).

Tabalion (*Eusideroxylon zwageri*)

This plant belongs to the Lauraceae family, known as borneo ironwood (ironwood) synonymous with *Eusideroxylon lauriflora* Auct. and *Bihania borneensis* Meissner. The plants grow the lowland forests habitat (500 m and rarely reaching 625 m asl.), Kalimantan and Sumatera is the main region distribution of the plant which also found in Tawi-Tawi Sulu archipelago of Philippines. The most important of the plant owing to the strength and endurance of the wood as construction material which is not vulnerable to termites and other ubiquitous tropical wood-eating insects (Irawan 2005).

Some people in Kalimantan used to use ironwood boiled water to treat a toothache, ironwood extract was able to inhibit the growth of bacteria *Staphylococcus aureus* in vitro (Darussalam 2016). Unfortunately, studies about *E. zwageri* which support its utilization as an aphrodisiac are still very much limited.

Gading (*Koilocedrus bantamense*)

Except for Kalimantan, *K. bantamense* is also found in Java, South-western and Peninsular Thailand, Laos, and the Malay Peninsula (Van Welzen 2009). In Kalimantan, fruits of this plant are used to treat swelling (Wahyuni 2011). Published reports and empirical utilization related to its medicinal properties are scarce.

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