Kaempferia galanga L.
Zingiberaceae

Marina Silalahi

Synonyms

Alpinia sessilis J. Koenig; *Kaempferia humilis* Salisb.; *Kaempferia latifolia* Donn ex Hornem.; *Kaempferia plantaginifolia* Salisb.; *Kaempferia procumbens* Noronha; *Kaempferia rotunda* Blanco (POWO 2019)

Local Names

Lao: ‘van ‘hom, varn horm. **Indonesia:** cekur, kencur (general), bataka (North Sulawesi, Ternate, Tidore, Halmahera), cekuh (Balinese), cokur (Dayak Tomun), hasihor (Batak Toba), hasohor (Batak Simalungun), keceur (Phakpak), keciwer (Batak Karo), kinsuli (Sanger). **Malaysia:** cekur, cekur Java, cengkur (Peninsular). **Philippines:** gisol (general), disok (Iloko), dusol (Tagalog, Cotabato, Laguna), dutui (Conner, Apayao), kesul (South, Central Mindano), kusol (Ati Negrito). **Thailand:** pro hom (general), homproh (Central) waam hom, waaam teen din (Northern). **Vietnam:** dia li[eef]n, s[ow]n nai, tam n[aj]i. **English:** galangal (Abellera et al. 2019; Angagan et al. 2010; Delang 2007; Ibrahim 1999; Maghirang et al. 2018; Oktavia et al. 2017; Ong and Kim 2014; Picheansoonthon and Koonterm 2008; Pandiangan et al. 2019; Rubio and Naive 2018; Santoso et al. 2019; Silalahi et al. 2018; Wakhidah et al. 2017).

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Botany and Ecology

***Description*:** Rhizomes pale green or greenish white inside, tuberous, fragrant. Leaves usually 2–3(−5) sheaths 1.5–5 cm long, blade often horizontal and appressed to the soil, broadly elliptical to suborbicular, 6–15 cm × 2(−5)–10 cm, acuminate, glabrous above, arachnoid-hairy below. Inflorescences terminal on pseudostems, enclosed by imbricate leaf sheaths, sessile, few to many flowered, bracts lanceolate 2.5 cm long. Calyx equaling bracts 2–3 cm long, corolla white, tube 2.5–5 cm long, lobes 1.5–3 cm long halfway or more, white or pale purple with violet to purple spot at base, each lateral lobe about 2–2.5 cm × 1.5–2 cm long, other staminodes oblong-obovate to oblanceolate, 1.5–3 cm long, white fertile stamen 10–13 cm long, connective deeply bilobed with reflexed lobes. Anther sessile; connective appendage strongly reflexed, rectangular, 2-lobed (Ibrahim 1999; Delin and Larsen 2000) (Figs. 1 and 2).

***Distribution and Habitat*:** *K. galanga* thrives best in slightly shaded places such as open forest edges, and bamboo forest on various soils up to 1000 m altitude (Ibrahim 1999). This taxon is distributed over a wide range: from India to Myanmar, China, Thailand, Indochina, Malay Peninsula, and Java (Picheansoonthon and Koonterm 2008).

Local Medicinal Uses

Cambodia: *K. galanga* is a medicinal plant used to treat most common ailments such as cold, fever, and malaria by the Bunong people in Mondulkiri province (Chassagne et al. 2016). **Lao:** The medicinal plant traders in the traditional market of Vientiane province prescribe root decoction to treat headache, to make perfume,

Fig. 1 *Kaempferia galanga* L. (ZINGIBERACEAE). JAKARTA, Indonesia. (Photo © M. Silalahi)

Fig. 2 Flower of *Kaempferia galanga* L. (ZINGIBERACEAE). JAKARTA, Indonesia. (Photo © M. Silalahi)

and to attract girls (Delang 2007). The rhizome is used to treat slow digestion, dyspepsia, bloating after eating, and swollen stomach by local people in Vientiane (Dubost et al. 2019). **Indonesia:** Batak ethnic community in North Sumatra province use rhizomes as an ingredient of traditional steam bath (*oukup*), and to treat diarrhea, malnutrition, rheumatism, and stomachache (Silalahi and Nisyawati 2019). The Batak Simalungun sub-ethnic in North Sumatra use rhizome concoctions to cure cough, asthma, digestive tract disorders, rheumatism, aphrodisiac, fever, and malnutrition (Silalahi et al. 2015). The rhizomes have been used to treat fever, hypertension, and in baby care by Sanger ethnic community of North Sulawesi (Pandiangan et al. 2019). The local communities in Halmahera in the North Moluccas use rhizomes as an ingredient of herbal drink used in *oke sow* ceremony (puberty ceremony) (Wakhidah et al. 2017). The Balinese mix it with wine for treating skin diseases, and as rheumatic pain relievers (Oktavia et al. 2017). The Dayak Tomun community in Central Kalimantan use rhizomes in pregnancy and postpartum healthcare. The leaves and rhizome are mixed with rice birdlime and pounded. It is then smeared on the head and stomach (Santoso et al. 2019). Indigenous groups at Lore Lindu National Park of Central Sulawesi use rhizomes to treat fever and vertigo (Pitopang et al. 2019). **Malaysia:** The rhizomes are used to cure hypertension, swelling, ulcer, sprain, and asthma; leaves and rhizomes are chewed to cure cough and sore throat. The rhizomes are also used in postpartum care, and fever (Ibrahim 1999). Malay people of Negeri Sembilan use rhizomes as a main ingredient of traditional bath (*mandiserom*) during postpartum care (Othman et al. 2014). **Philippines:** The Ati Negrito people in Guimaras use poultice of rhizomes to treat injuries from plant thorns or spines. Heated and pounded leaves are rubbed externally to treat

sudden cough (Ong and Kim 2014). The local communities in North Cotabato of Mindanao use the rhizome and leaf extract poultice to treat bleeding wounds, mumps, and prickle (Rubio and Naive 2018). The local people in Laguna province use leaf decoction to treat skin diseases (Abellera et al. 2019). **Thailand:** In Thai traditional medicine, rhizomes are used to treat hypertension, asthma, rheumatism, digestive tract disorders, headache, and stomachache (Sirisangtragul and Sripanidkulchai 2011).

Phytochemistry

Leaves: The main chemical constituents of leaves extracted through hydro distillation are linoleoyl chloride, caryophyllene oxide, cubenol, and caryophyllene (Bhuiyan et al. 2008). **Rhizomes:** The rhizomes contain monoterpenoids, sesquiterpenoids, and phenylpropanoids (Liu et al. 2014). The volatile oil from rhizome contains ethyl-trans-p-methoxycinnamate and trans-ethyl cinnamate (Tewtrakul et al. 2005; Raina and Abraham 2015), methylcinnamate, carvone, eucalyptol, and pentadecane (Tewtrakul et al. 2005), 2-propenoic acid, 3-(4-methoxyphenyl), ethyl ester, phthalic acid, 6-ethyloct-3-yl2-ethylhexyl ester, palmitate acid, sandaracopimaradiene, oleate acid, oktadekanoate acid, 2-[2-(4-nonylphenoxy)ethoxy]ethanol, and glycidyl stearate (Ali et al. (2018). Tricyclene, α-pinene, camphene, δ-3-carene, β-cymene, 1,8-cineole, chrysanthenone, *trans*-pinocarveol, camphor, borneol, *p*-cymen-8-ol, eucarvone, *p*-anisaldehyde, *trans*-cinnamaldehyde, bornyl acetate, sabinyl acetate, α-copaene, cyperene, ɤ-elemene, *trans*-ethyl cinnamate, ethyl cinnamate, ɤ-muurolene, δ-cadinene, calamenene, spathulenol, caryophyllene oxide, zierone, and ethyl *p*-methoxycinnamate are reported from rhizome essential oil (Liu et al. 2014).

K. galanga shows antineoplastic activity against Ehrlich Ascites Carcinoma (EAC) cells *in vivo* (Ali et al. 2018), and its ethanol extract showed toxicity to human carcinoma cells (HeLa) (CD_{50} 10–30% μg/ml) (Ibrahim 1999). Ethyl-*p*-methoxycinnamate (EPMC) has antiangiogenic (Umar et al. 2012), antibacterial, and antituberculosis properties (Lakshmanan et al. 2011). Rhizome extract inhibits growth of bacteria such as *Mycobacterium tuberculosis* (Lakshmanan et al. 2011), *Staphylococcus aureus, Streptococcus faecalis, Bacillus cereus, Bacillus subtilis, Escherichia coli, and Enterobacter aerogens.* It also inhibited growth of *Klebsiella pneumoniae, Vibrio cholera, Pseudomonas aeruginosa* (Kochuthressia et al. 2012), yeast (*Candida albicans*) (Rahmi et al. 2016; Kochuthressia et al. 2012), *Aspergillus niger*, *A. flavus, A. fumigatus* (Kochuthressia et al. 2012), and *Cryptococcus neoformans* (Gholib 2009). Dash et al. (2015) reported that extract of rhizomes at dose of 400 μg/disc has moderate antibacterial activity against Gram-positive and Gram-negative bacteria, compared to ciprofloxacin (5 μg/disc). The EPMC inhibits growth of *M. tuberculosis* H37Ra, H37Rv (clinical isolates are sensitive and resistant to commercial drugs) with minimum inhibitory concentration (MIC) 0.242–0.485 mM (Lakshmanan et al. 2011), and *C. albicans* in vitro with MIC 50 mg/ml and a minimum kill concentration 60 mg/ml (Rahmi et al. 2016).

Local Food Uses

Indonesia: Rhizomes are used as spice in preparations such as *pecel* or *gado-gado* (vegetable salad); its shoots/young leaves are cooked as vegetables**. Thailand:** The rhizomes and leaves are used as a spice in local Thai delicacies. The rhizomes together with chilies and other ingredients are mixed and ground into a paste, and used as a base for making curry. The leaves are washed and cut into very thin pieces and used for seasoning curry (Picheansoonthon and Koonterm 2008). **Philippines:** Local people in South Central Mindanao use leaves as flavoring agents in cooked rice (Maghirang et al. 2018).

Biocultural Importance

Indonesia: It is one of most important plant in Batak traditional medicine, forming one of the five species of *kesaya silima lima* (five main plants in traditional medicine), and *hosaya sitolu-tolu* (three main plants in traditional medicine; Batak Karo) (Silalahi 2014). The *jamu beras kencur* (*jamu* = fresh traditional concoction drinks; *beras* = rice; *kencur* = galangal), a Javanese heritage formulation has been long used to maintain health and stamina (Sumarni et al. 2019).

Economic Importance

Indonesia: Rhizomes and young shoots have been traded as economic commodities in both traditional and modern markets, for use as spices or in traditional medicine. The *jamu beras kencur* is sold by Javanese women in Semarang, Central Java (Sumarni et al. 2019). **Lao:** Rhizomes are traded as medicinal ingredient in the traditional markets of Vientiane province (Delang 2007).

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