Scorodocarpus borneensis

Scientific Name

***Scorodocarpus borneensis* (Baill.) Becc.**

Synonyms

Ximenia borneensis Baillon.

Family

Olacaceae, also placed in Strombosiaceae, Erythropalaceae.

Common/English Names

Bawang Hutan, Forest Onion, Garlic Nut, Nutwood Garlic, Sindu, Wood Garlic, Woodland Onion.

Vernacular Names

Borneo: Bawang Hutan, Ja'oi, Kayu Hindu, Kesidu, Kisinduh, Mencorug, Sagad-Berauh, Sindok;
Brunei: Bawang Hutan;
Indonesia: Kayu Bawang Utan (Kalimantan), Kulim (Sumatra);
Peninsular Malaysia: Bawang Hutan, Kulim (Malay), Dali-Dali, Kalip (Sakai);
Sabah: Bawang Hutan (Malay);
Sarawak: Kesindu (Iban), Kayo Kesindo (Kelabit), Bawang Hutan (Malay);
Thailand: Kuleng.

Origin/Distribution

The species occurs in Peninsular Thailand, Peninsular Malaysia, Sumatra, and throughout the island of Borneo.

Agroecology

S. borneensis is found in undisturbed to slightly disturbed (open) mixed dipterocarp forests up to 900 m altitude. It occurs scattered but may be locally common or even gregarious in primary rain forest on alluvial sites near rivers and streams and on hillsides. In secondary forests, it is usually present as a pre-disturbance remnant.

Edible Plant Parts and Uses

The bark and nuts (endocarp) are used to flavour food (as onion/garlic substitute). The nuts are roasted and eaten with salt or grated. Young leaves are used as vegetable.

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Botany

An evergreen, spreading, medium-sized tree (Plate 1) or rarely large up to 40 m tall, with 210 cm girth, fissured bark with weakly elongate, adherent scales and small, dense crown; all parts smelling of garlic. Leaves simple, alternate, green, ex-stipulate, oblong-elliptic, 10–22 cm by 4–9 cm wide, acuminate tip, base rounded to cuneate, margin entire, glabrous, thinly coriaceous, 5–6 pairs of secondary veins, tertiary nerves scalariform (Plate 2). Petioles 15 mm weakly keeled distally. Flowers in an axillary, short raceme, 4-5-merous; calyx cup-shaped, margin wavy to toothed; petals reflexed, white and hairy inside, pinkish on the outside; stamens 8 or 10, inserted in pairs about halfway on the petal; ovary superior, imperfectly 3-4-locular with a single ovule in each cell, style with 3–4 minutely lobed stigmas (Plates 3 and 4). Fruit a thinly fleshy, sub-globose to ovoid, 1-seeded, green drupe, up to 4 cm long, on a stout 1 cm stalk (Plates 5 and 6); endocarp (stone) woody with longitudinal strands.

Nutritive/Medicinal Properties

The nutritive value of the leaves per 100 g edible portion had been reported as follows: energy 93 kcal, moisture 66.5%, protein 3.7%, fat 3.6%, carbohydrate 11.6%, crude fibre 13.7%, ash 0.9%, P 46 mg, K 405 mg, Mg 33 mg, Mn 20 ppm, Zn 10 ppm and vitamin C 3.5 mg (Voon et al. 1988; Voon and Kueh 1999).

A new sesquiterpene, scodopin, and a mixture of three tryptamine-type alkaloids, scorodocarpines A-C, were isolated from the fruits of *Scorodocarpus borneensis*, together with a known hemisynthetic sesquiterpene, cadalene-β-carboxylic acid, which was isolated from the bark (Wiart et al. 2001). An aliphatic sulfur compound, bis-(methylthiomethyl)disulfide, a new sesquiterpene, scopotin, and a new indole alkaloid, 13-docosenoyl serotonine were isolated from the seed (Wiart 2001). Two new natural amino acids, (Rs)-3-[(methylthio)methylsulfinyl]-l-alanine and S-[(methylthio)methyl]-l-cysteine, were isolated from the fruit of *Scorodocarpus borneensis* (Kubota et al. 1998). C–S lyase-mediated enzymatic conversion showed that both amino acids play an important role in developing the main odorous components of methyl methylthiomethyl disulfide and bis(methylthiomethyl) disulfide.

Thirteen compounds including four megastigmanes and five flavonoids were isolated from the leaves of *Scorodocarpus borneensis* (Abe and Yamauchi 1993). One of the megastigmanes, scorospiroside, was elucidated as 3,5-dihydroxy-6,9-epoxymegastigmane-3-O-β-d-glucoside.

Some pharmacological properties reported from wood garlic are elaborated below.

Plate 1 Spreading tree habit

Plate 2 Leaves and inflorescences

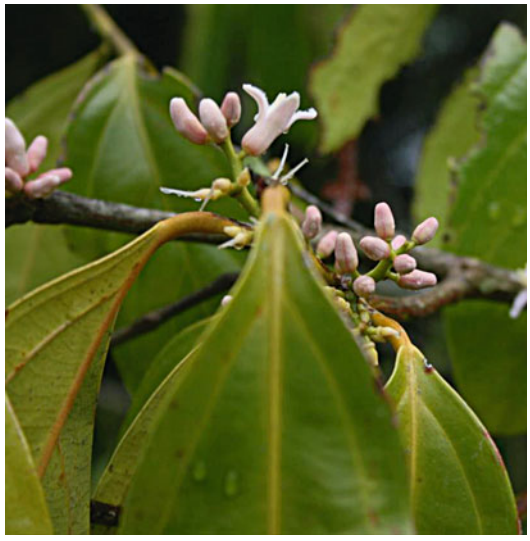

Plate 3 Pinkish–white flowers and pink buds

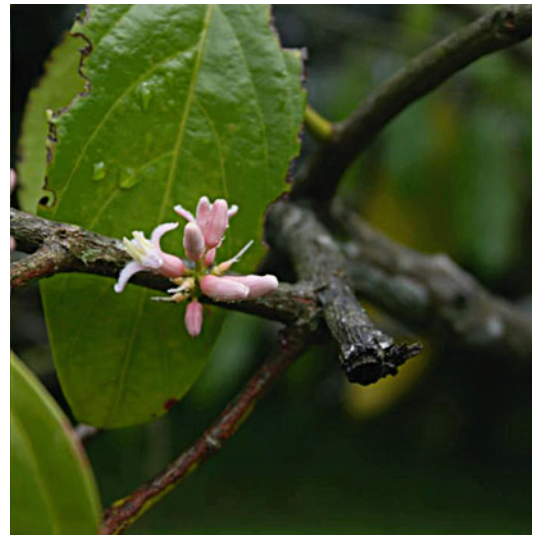

Plate 4 Open flower: reflex petal with white inner surface, pinkish outer surface

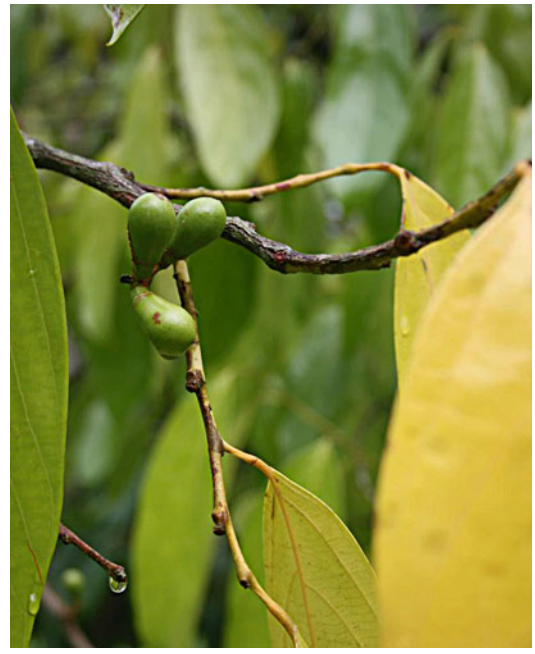

Plate 5 Fasicle of young wood garlic fruits

Antiplatelet Activity

Three pure compounds isolated from wood garlic, 2,4,5-trithiahexane (I), 2,4,5,7-tetrathiaoctane (II), and 2,4,5,7-tetrathiaoctane 2,2-dioxide (III),

Plate 6 Close-up of young wood garlic fruit with stout stalk

were shown to inhibit rabbit platelet aggregation induced by collagen, arachidonic acid, U46619, ADP (adenosine 5'-diphosphate), PAF (platelet aggregating factor), and thrombin (Lim et al. 1999). Compounds I, II, and III exhibited a stronger inhibitory effect against the thrombin-induced aggregation of GFP (gel-filtered platelets) than against the aggregation induced by the other agonists. In inhibiting collagen-induced aggregation, II was as potent as methyl allyl trisulfide and aspirin, with a marked disaggregation effect on the secondary aggregation by arachidonic acid. I, II, and III also suppressed U46619-induced aggregation. These results suggested that sulfur-containing compounds in wood garlic not only inhibit arachidonic acid metabolism but also suppress aggregation in association with the function of the platelet plasma membrane.

Antimicrobial Activity

Three novel sulfur-containing compounds 2,4,5,7-tetrathiaoctane 4,4-dioxide ($CH_3SCH_2SO_2SCH_2SCH_3$) (1); 5-thioxo-2,4,6-trithiaheptane 2,2-dioxide ($CH_3SO_2CH_2SCSSCH_3$) (2), and O-ethyl S-methylthiomethyl thiosulfite ($CH_3SCH_2SS(O)OCH_2CH_3$) (3) were isolated from *Scorodocarpus borneensis* (Lim et al. 1998). Compounds 1 and 2 exhibited antimicrobial activity against some bacteria and fungi. The volatiles of wood garlic fruit contained a large amount of ethanol, most of the components were sulfur-containing (Kubota and Kobayashi 1994). Methyl methylthiomethyl disulfide (I) and bis(methylthiomethyl) disulfide (II), two polysulfides were determined to be potent odor compounds of *S. borneensis* by a sensory evaluation. Relatively strong antimicrobial activity was observed in the ethanol extract of the fruit; II and methylthiomethyl (methylsulfonyl)methyl disulfide (III) were isolated as the active components. II exhibited relatively strong antifungal activity, while III, a novel compound, exhibited broader activities than II against bacteria and fungi. These results showed that the fruit of *S. borneensis* possesses useful properties for use as a natural preservative. bis-(methyithiomethyl)-disulfide appeared as the most active compound and the major constituent of the seeds extract of *Scorodocarpus borneensis*; it acted significantly on a methicillin resistant strain of *Staphylococcus aureus* (Wiart 2001). The crude petroleum ether seed extract and bis-(methyithtomethyl)-disulfide strongly inhibited in-vitro, the growth of pathogenic fungi, *Candida albicans*, *Candida lipolytica, Saccharomyces lipolytica*, and *Aspergillus ochraceous* and was formulated in external preparation by using commercial paraffin as excipient.

Anticancer Activity

Bis-(methylthiomethyl)-disulfide from the seeds of *Scorodocarpus bomeensis* showed a strong cytotoxic activity against CEM-SS leukemia cell-line and KU812F chronic myelogenous leukemia cell lines (Wiart 2001). 13-docosenoyl serotonine exhibited moderate cytoxicity activity against CEM-SS leukemia cell line while scopotin showed strong cyotoxic effect against CEM-Sleukemia cell line and moderate antimicrobial activity.

Traditional Medicinal Uses

In Peninsular Malaysia, an infusion of the bark is sometimes used as an antidote for Ipoh poisoning "antiaris" (*Antiaris toxicari*a Lesch.). In Sarawak, the leaves and bark are boiled and drank to treat leprosy and diabetes.

Other Uses

It provides a first class timber, heavy, hard dark-purplish red-brown with a garlic odour when fresh and peppery odour when dry. The timber is used for medium to heavy construction of beams, joists, posts, door and window frames, parquet flooring and planks for houses; rafters, piling for bridges, salt-water piling (with bark on), planks for boat keels, mine props, transmission posts, agricultural implements and sleepers in temporary railway lines. The bark is used for tanning. The shell of the fruit may be made into tobacco boxes and humming-tops.

Comments

The species is widespread in its native range and is not at risk of genetic erosion.

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