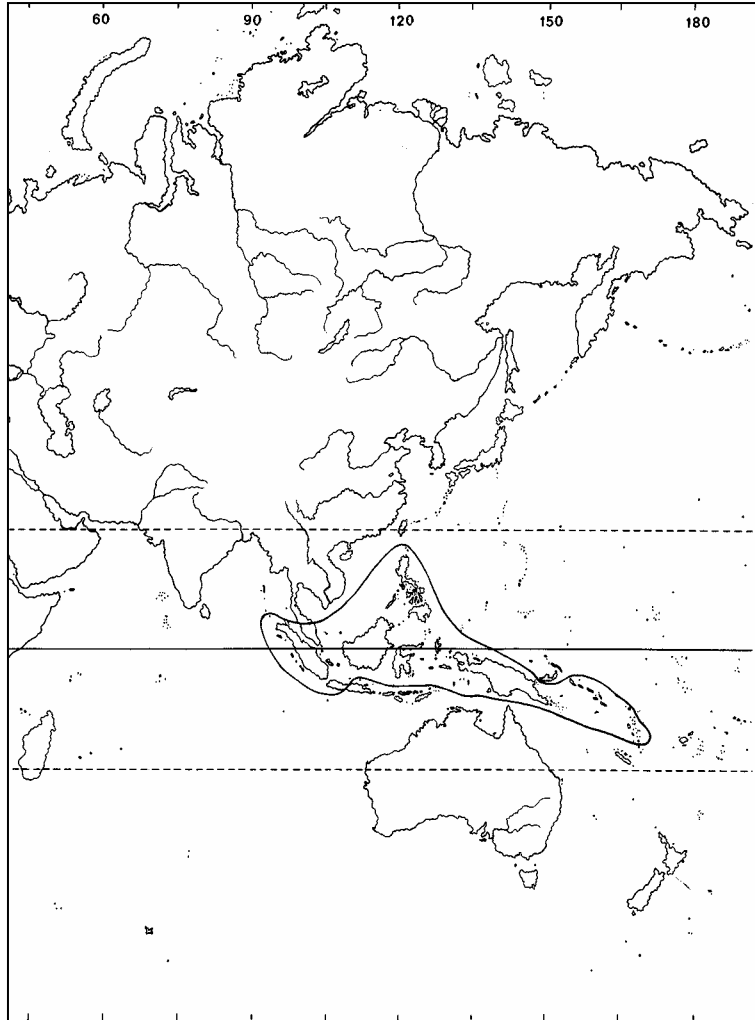




- Commercial species:** *G. affinis* Radlk., *G. banacanus* (Miq.) Kurz, *G. forbesii* Gilg, *G. macrophyllus* (Miq) Airy Shaw, *G. maingayi* Hook f., *G. velutinus* Airy Shaw (for full species list see below).
- Commercial names:**
- | | |
|----------|--|
| engl.: | ramin |
| esp.: | ramin |
| fr.: | ramin |
| indon.: | gahara buaya (Sumatra, Kalimantan), medang keladi (Kalimantan) |
| malay.: | gaharu buaya (Sarawak), melawis |
| philip.: | lanutang-bagyo, anauan |
- Common names:** Ramin
- Scientific synonyms:** --
- Subject to CITES control:** Included in Appendix III.
- Macroscopic characteristics of the wood:** Wood creamy to yellowish white, diffuse porous, growth rings absent or indistinct. Sapwood and heartwood not differentiated. Grain straight to shallowly interlocked. Texture moderately fine and even. With unpleasant odour when freshly sawn, but odour absent after drying.
Hardness: moderately soft to moderately hard
Specific weight: 0.60-0.72 (0.46-0.84) g/cm³ (at 12% rh)
- Microscopic characteristics of the wood:** Wood diffuse porous. Growth rings indistinct. Vessels solitary and in radial multiples of 2-3 (--4), 3-9/sq.mm, tangential diameter 90-190 microns, perforation plates simple. Intervascular pits minute (3-4 microns), alternate, and vested. Yellowish contents often present in the perforation plate area. Parenchyma paratracheal, winged-aliform to confluent, wings usually thin and long. Rays homogeneous (very rarely weakly heterogeneous with one row of square marginal cells), almost exclusively uniseriate, sometimes with biseriate portions (biseriate fairly common in *G. macrophyllus*), with a frequency of 9 to 10/mm. Fibres thin-walled to medium thick-walled, nonseptate, 1.1-1.9 mm long, with small but distinctly bordered pits. Crystals prismatic, diamond-shaped, or slightly elongate (short styloids) in axial and ray parenchyma. Crystals sporadic or absent in some specimens.
- Characteristics of the trees:** The timber producing species are small to medium-sized, evergreen trees up to 42 m tall, and 60 (120) cm in bole diameter. The trees can be locally very common in lowland peat swamp forests. The trunks are cylindrical, usually without buttresses, sometimes fluted at the base. The bark is smooth to cracked, shallowly fissured or scaly.
- Characteristics of the trade:** Ramin is one of the major export timbers of South-East Asia, with Sarawak and Penninsular Malaysia as the most important exporters. Indonesia also used to be a major exporter. Ramin accounted for a very high proportion of the sawn timber export, because of the dominance of Ramin in the lowland peat swamp forests.

Distribution:

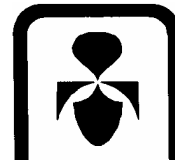
Throughout Malaysian region with the exception of Central and East Java and the Lesser Sunda Islands. N. Borneo (especially Sarawak) is a centre of species diversity. Eastwards the distribution area extends towards the Solomon Islands, Nicobar and Fidji.

**Use:**

The whitish and light to medium-density wood is a typical multipurpose timber, and is much used for furniture, wall panelling, light flooring, toys, turnery, venetian blind slats, dowels, picture frames, barrels, boxes and drawing boards. It is also used in light construction such as doors, window frames, and stairs, and as light veneer. The timber is highly susceptible to various fungal and insect attacks, and is therefore always used indoors. Like the genus *Aquilaria* (Gaharu), species of *Gonystylus* are capable of producing the highly priced incense "gaharu" in its pathological heartwood.

Similar species:

There are about 30 species of *Gonystylus*, of which the timbers cannot be confidently separated from each other. Among tropical hardwoods, the combination of whitish heartwood colour, uniseriate rays, vested pits, and prismatic crystals also occurs in some species of *Terminalia* (Limba, Framiré, of African provenance). These woods can be distinguished microscopically by their larger intervessel pits (4-- 9-11 /um, and less conspicuously bordered fibre pits. *Aquilaria*, the main producer of the incense "gaharu" in its pathological heartwood, differs from *Gonystylus*



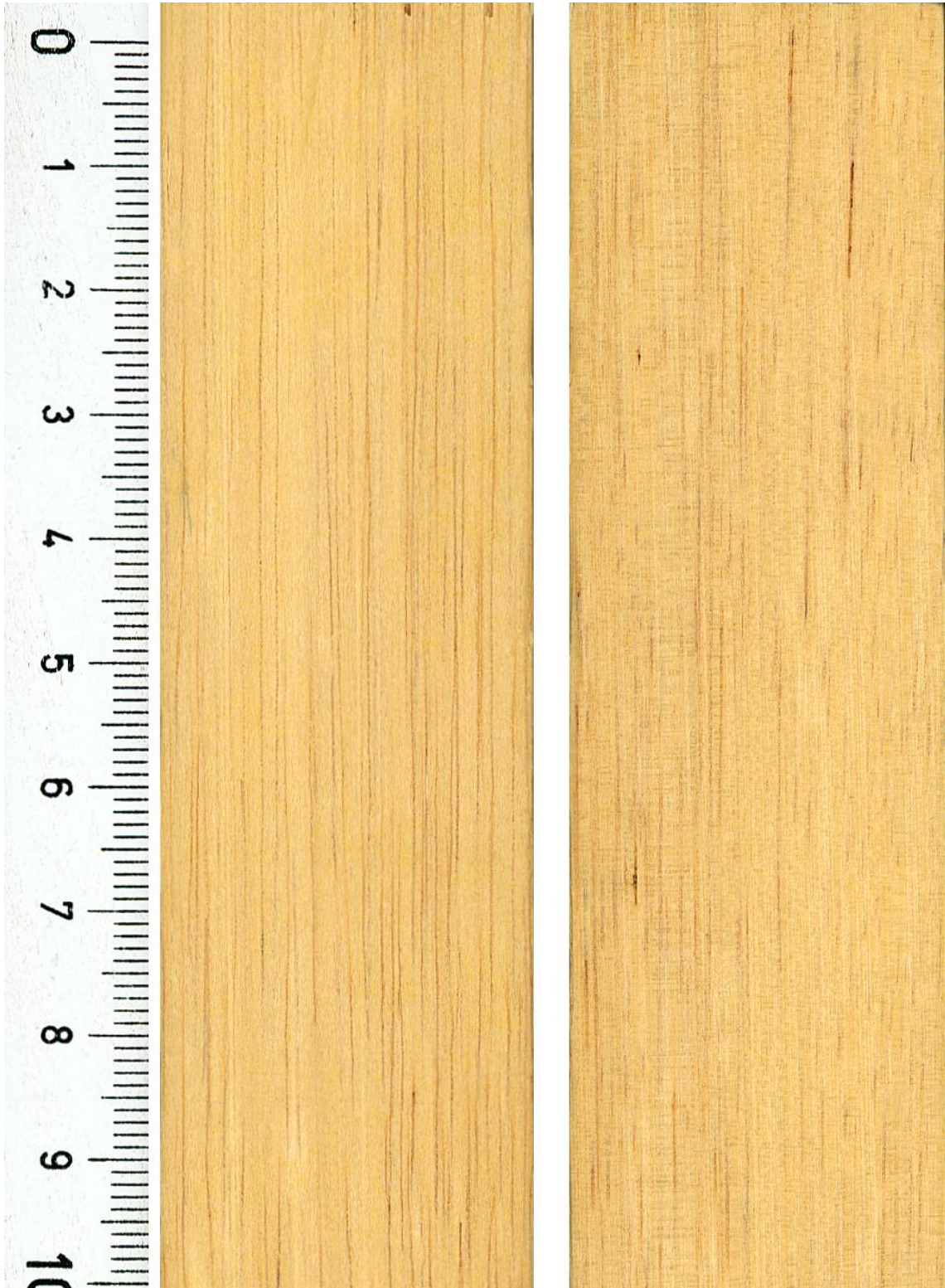
in having included phloem strands scattered throughout the wood, and hardly produces big enough trees for marketable timber: most *Aquilaria* species are shrubs or small trees.

	Distribution	Common name
<i>Terminalia ivorensis</i>	Tropical Africa	Black afara, Framiré
<i>Terminalia superba</i>	Tropical Africa	Limba

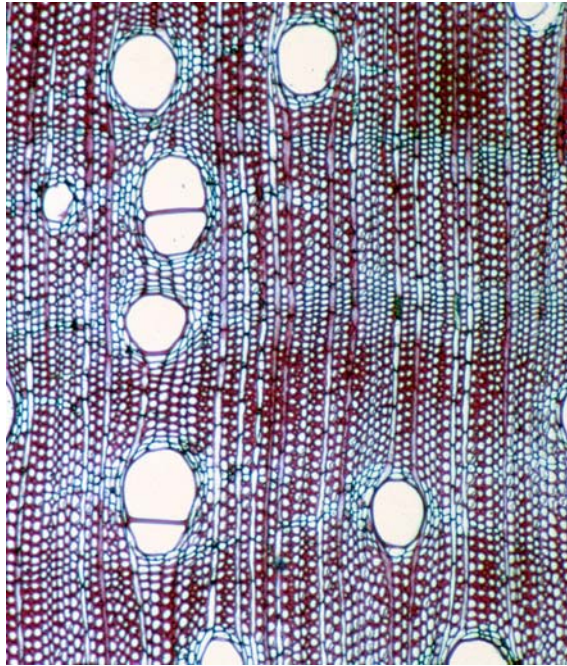
List of *Gonystylus* species:

	Distribution
<i>G. acuminatus</i> Airy Shaw	Borneo*), Sumatra, Malay Peninsula
<i>G. affinis</i> Radlk.	Malay Peninsula, Borneo
<i>G. areolatus</i> Domke ex Airy Shaw	Borneo
<i>G. augescens</i> Ridl.	Borneo
<i>G. bancanus</i> (Miq.) Kurz	Malaysia and Indonesia
<i>G. borneënsis</i> (Tiegh.) Gilg	Borneo
<i>G. brunnescens</i> Airy Shaw	Malaysia
<i>G. calophylloides</i> Airy Shaw	Borneo
<i>G. calophyllus</i> Gilg	Borneo
<i>G. confusus</i> Airy Shaw	Malay Peninsula, Sumatra
<i>G. consanguineus</i> Airy Shaw	Borneo
<i>G. costalis</i> Airy Shaw	Borneo
<i>G. decipiens</i> Airy Shaw	Borneo
<i>G. eximius</i> Airy Shaw	Borneo
<i>G. forbesii</i> Gilg	Sumatra, Borneo
<i>G. glaucescens</i> Airy Shaw	Borneo
<i>G. keithii</i> Airy Shaw	Borneo
<i>G. lucidulus</i> Airy Shaw	Borneo
<i>G. macrophyllus</i> (Miq.) Airy Shaw	Throughout Malaysian region
<i>G. nervosus</i> Airy Shaw	Borneo
<i>G. macrocarpus</i> C.T. White	Solomon islands
<i>G. micranthus</i> Airy Shaw	Borneo
<i>G. maingayi</i> Hook f.	Malay Peninsula, Sumatra
<i>G. pendulus</i> Airy Shaw	Borneo
<i>G. punctatus</i> A.C. Smith	Fiji
<i>G. reticulatus</i> (Elm.) Merr.	Philippines
<i>G. spectabilis</i> Airy Shaw	Borneo
<i>G. stenosepalus</i> Airy Shaw	Borneo, Sarawak
<i>G. velutinus</i> Airy Shaw	Indonesia
<i>G. xylocarpus</i> Airy Shaw	Borneo

*) Borneo = Sabah, Sarawak (Malaysia), Brunei and Kalimantan (Indonesia)



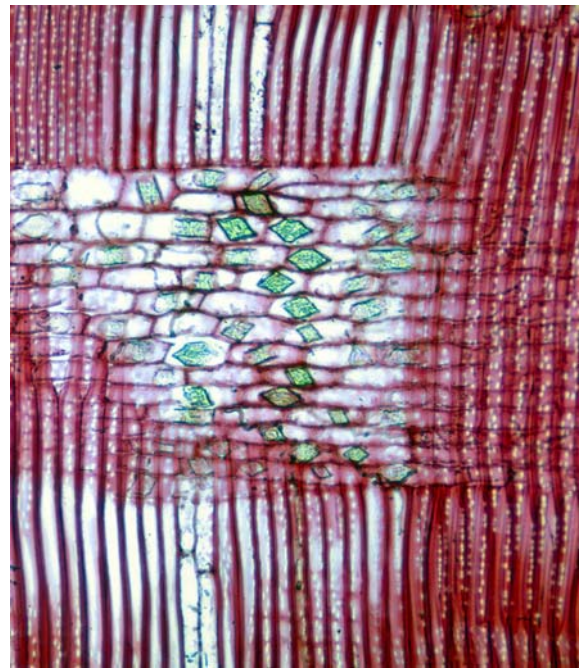
Gonystylus bancanus



Gonystylus bancanus, transverse section



Gonystylus bancanus, tangential section



Gonystylus bancanus, radial section