

NOTES

GONYSTYLUS BANCANUS : SOME OBSERVATIONS ON ITS FLOWERING, FRUITING, SEED PREDATION AND GERMINATION

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Gonystylus bancanus, commonly known as ramin, belongs to the family Thymelaeaceae (Whitmore 1972). It is one of seven species of this genus recorded in Peninsular Malaysia and is the only one found in peat swamp forests. A commercially important timber species, it can attain a height and diameter at breast height exceeding 30 m and 70 cm respectively. A detailed description of its anatomy and wood properties is given by Whitmore (1972) while Sim (1983) describes the different uses of the wood which include cabinets and interior paneling.

Peat swamp forests are the major sources of ramin timber. This is in comparison to ramin obtained from the other *Gonystylus* spp. which are from dryland forests. Wyatt-Smith (1959) reports that it was abundant in the peat swamps of Perak, Selangor, Johore and Pahang. Most of these areas have now been converted to agriculture with significant areas remaining only in Selangor and Pahang. In peat swamps in Pahang, *G. bancanus* accounted for 10.6 m³ ha⁻¹ and this represented 17% of the total timber produced from those sites.

A 4-ha study plot was established in the primary peat swamp forest at Pekan Pahang. A total of 48 individuals of *G. bancanus* of 25 cm dbh were enumerated of which more than half were less than 10 cm dbh. It was noted that individuals in this size class (between 5 cm and 10 cm dbh) tended to be grouped near mother trees. Seedling regeneration on the forest floor was poor. This was attributed to high predation on immature fruits on the trees by bats and squirrels. In addition seeds on the forest floor are highly susceptible to insect and fungal attack. Flowering and fruiting also appear to be infrequent.

Flowering and fruiting

For the purpose of future phenological observations, 15 mature trees of *G. bancanus* ranging from 20 to 60 cm dbh were marked in the proposed Virgin Jungle Reserve at Pekan peat swamp forest. People living in the vicinity reported a mass fruiting in 1992. A somewhat sporadic flowering and fruiting were observed in 1994. Fruits were collected and measured at 5 to 6 cm in diameter. These fruits are borne terminally. When they dehisce they reveal three septa separating the seeds but only one mature seed was obtained from each fruit (Figure 1). The time lapse between flowering and the ripening of fruit is not precisely known but can be surmised to be about four months. This is by comparison with observations made on related species or groups (Mohd. Ghazali & Rahim 1985, on *Aquilaria malaccensis* of the same family, Thymelaeaceae; Sasaki *et al.* 1979, on the dipterocarps in the Forest Research Institute of Malaysia).

Factors that trigger the flowering of *G. bancanus* remain unknown. While many possible factors including rainfall, temperature, sunshine and drought have been sug-

gested by many authors such as Foxworthy (1927), Boswell (1940), Burgess (1972), Medway (1972), Ng (1977) and Appanah (1985), the arguments presented are not yet conclusive. For this reason the important and possible causative environmental parameters of temperature, rainfall, intensity and duration of sunshine will be monitored in the vicinity of this stand of *G. bancanus*.

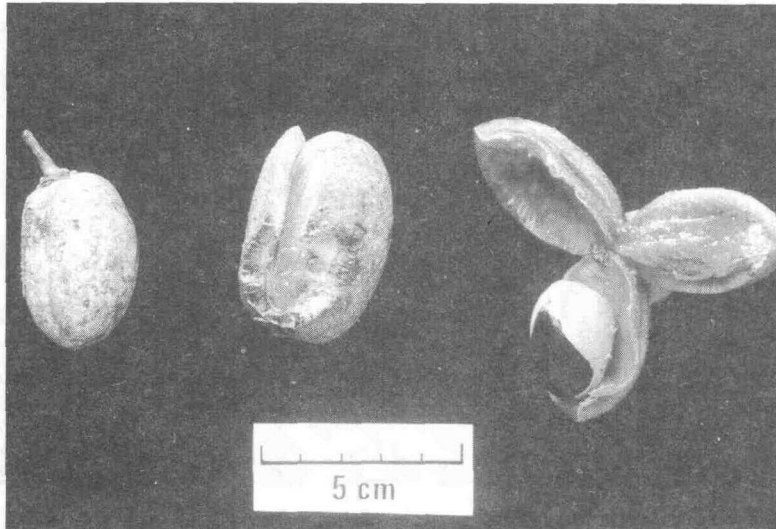


Figure 1. A mature fruit of *Gonystylus bancanus*

Predation

Seeds in the research plot of the Pekan peat swamp forest showed signs of predation. Squirrels during the day and bats at night were observed feeding on young fruits. The species involved need to be identified. In Sulawesi, Kevan and Gaskell (1986) noted that the seeds of *G. macrophyllus* (a common dryland species) were predated upon by a fruit bat *Rousettus celebensis* and were carried only a short distance from the mother tree on account of the relative size of the seeds compared to that of the bat. They also observed a high percentage of seeds on the ground below the mother trees showing the puncture marks of the bats teeth. In Pekan it was also noted that any fruit that fell to the ground and did not germinate immediately was attacked by insects or fungi.

Germination

Germination tests were conducted at the FRIM nursery. Germination percentage of *G. bancanus* was 63%. Seeds were untreated prior to the test made on a mixture of ordinary soil and sand at a 3: 1 mixing ratio. Seeds were watered twice daily and began germinating 9 days after sowing. Ng (1992) classified the germination as hypogeal with non-emergent cotyledons. Figure 2 shows a hypocotyl that is not elongated but an epicotyl that is strongly elongated. The seedlings developed into the two-leaf stage in 12 to 14 days after sowing. The first two leaves were opposite while the subsequent leaves were spiral or alternate. A similar germination test was carried out in the forest but the germination rate was very poor. This was largely due to the seeds being attacked by insects or fungi.

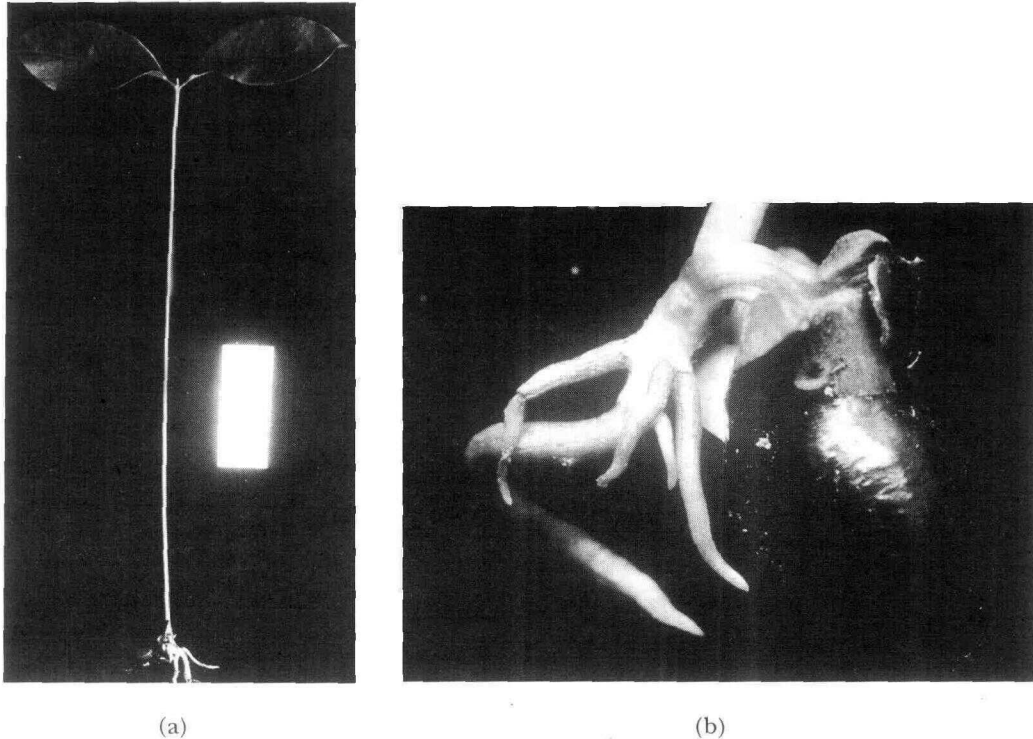


Figure 2. A newly germinated *Gonystylus bancanus* with a typical elongated epicotyls (a) and non-emergent cotyledons (b)

References

- APPANAH, S. 1969. General flowering in the climax rain forests of South-east Asia. *Journal of Tropical Ecology* 1 : 225 - 240.
- BOSWELL, A.B.S. 1940. Rainfall and the flowering of *Shorea*. *Malayan Forester* 9(4) : 175 - 177.
- BURGESS, P.F., 1972. Studies on the regeneration of the hill forests of the Malay Peninsula. *Malayan Forester* 35 : 103 - 122.
- FOXWORTHY, F.W. 1927. *Commercial Timber Trees of the Malay Peninsular*. Malayan Forest Records No. 3. Federated Malay States Government. 195 pp.
- KEVAN, P.G. & GASKELL, B.H. 1986. The awkward seeds of *Gonystylus macrophyllus* (Thymelaeaceae) and their dispersal by the bat *Rousettus celebensis* in Sulawesi, Indonesia. *Biotropica* 18(1): 76 - 78.
- MEDWAY, L. 1972. Phenology of tropical rain forest in Malaya. *Biological Journal of the Linnean Society* 4 : 117 - 146.
- MOHD. GHAZALI, O. & ABD. RAHIM, A. S. 1985. Flowering-to-fruiting period of Malaysian forest trees. *Malaysian Forester* 48(3): 254 - 257.
- NG, F.S.P. 1977. Gregarious flowering of dipterocarps in Kepong. *Malaysian Forester* 40(7): 126 - 137.
- NG, F.S.P. 1992. *Manual of Forest Fruits, Seeds and Seedlings*. Vol. 2. No. 34. Malayan Forest Records. Forest Research Institute Malaysia, Kepong.
- SASAKI, S., TAN, C.H. & ZULFATAH, A. R. 1979. Some observations on unusual flowering and fruiting of dipterocarps. *Malaysian Forester* 42(1): 38 - 45.
- SIM, H.C., 1983. *Malaysian Timber - Ramin*. Timber Trade Leaflet No. 74. The Malaysian Timber Industry Board.
- WHITMORE, T.C., 1972. *Tree Flora of Malaya*. Vol. 2. Longman, Kuala Lumpur.
- WYATT-SMITH, J., 1959. Peat swamp forests in Malaya. *Malayan Forester* 22(1) : 5 - 32.