

Eusideroxylon zwageri Teijsm. & Binnend.

Family: Lauraceae

Vernacular names: English – ironwood; Malaysia – belian (Sarawak and Sabah), tambulian (Sabah), im muk (Cantonese, Sabah); Indonesia – ulin, belian, biliran, tebelian, tulian; Philippines – tambulian, sakian; French – bois de fer

Origin and geographical distribution: *E. zwageri* is distributed in Sumatra, Borneo, Bangka, Belitung, Sulu Archipelago, and Philippines (Palawan). In Kalimantan and Sumatra it is widespread as a scattered component of the dipterocarp forest and in some localities forms a single dominant variant. It is generally found in lowland areas of primary forest up to 400 m above sea level, in flat or sloping terrain, and also occurs in old secondary forest (Suselo 1987).



Fig. 1 Natural distribution of *E. zwageri*

Description: The tree may reach a height of 30 m, with trunk diameters of exploitable trees up to 90 cm. Leaves arranged spirally, not scale-like; simple, flushing red. Fruit berry-like; long ellipsoid, hard. One seed per fruit; much more than 5 cm long, or more than 10 cm long.

Uses: *E. zwageri* is usually used in heavy construction, marine work, boatbuilding, piling, printing blocks, specialty furniture, flooring, roofing single and tool handles.

Ecology, propagation, planting, breeding: *E. zwageri* is a tree of the tropical rainforest zone. The mean temperature is usually within the range of 25–35°C and the annual rainfall range commonly 2500–3900 mm. In Kalimantan, *E. zwageri* can grow at 100–600 m above sea level with a density of 4–8 trees/ha. Irawan and Gruber (2003) have reported that *E. zwageri* in Jambi grows associatively with more than hundred tree species such as *Palaquium hasseltii*, *Ochanostachys amentacea* and *Shorea* spp.

Flowering can occur even throughout the year depending on location and climate. The flowers burst in August–November in Palembang; in July in



Fig. 2 Profile of *E. zwageri* tree
a: 2-month old seedling
b: 5-month old seedling
c: old tree in natural distribution, Central Kalimantan

Jambi; April, June, August, November, December in Belitung; and October and November in South Kalimantan. Time from flower to seed maturity may be as short as 3 months. Peak of seed harvesting is in beginning or middle of the wet season. Genetic conservation programme of *E. zwageri* is the first step for a breeding programme in Indonesia. The CFBTI has collected seeds from some populations in Kalimantan. Naturally regenerated seedlings can be found under mother trees in natural forests. Vegetative propagation with sprout cutting is a feasible regeneration technique for this species.

Genetic diversity and conservation status of the species: *E. zwageri* has been a favoured species both for local use and trade. As a result, *E. zwageri* is still decreasing in natural forests. Overexploitation is the main reason for the decline of the species. In Sumatra, the species is almost entirely destroyed (WWF and IUCN 1994–1995). *E. zwageri* is totally protected in Indonesia; exporting is forbidden and cutting is restricted to trees over 60 cm dbh. Strict regulations for logging of the species are in place also in Sarawak since 1950. Partomihardjo (1987) pointed out that control of exploitation and better cutting criteria are needed to conserve the species. There are attempts to conserve supplies of this species in Sarawak. Under the Forest Rules of Sarawak, export of *E. zwageri* as roundwood or sawn and hewn form is not allowed without special permission. Plantations of the species in large scale have not been established yet.

Research on the genetic conservation of the species: Research on *E. zwageri* is still limited and most of the research is focusing on developing propagation techniques for the species. There has not yet been any study that examined the genetic diversity of the species. In 2003, the CFBTI initiated a conservation programme for *E. zwageri*. The first activity is the collection of materials from natural population. The materials will be used to establish *ex situ* conservation plots. Some natural populations have been observed for *in situ* conservation of the species. The CFBTI and Tropenbos International Indonesia are carrying out research cooperation for the species with the title “Sustainable Management

of the Tropical Rain Forest in Kalimantan: Silviculture Development and Genetic Conservation of Eusideroxylon zwageri Teijsm. & Binnend.”

National agencies active in genetic conservation of *E. zwageri*: Centre for Forest Biotechnology and Tree Improvement R&D (CFBTI), Yogyakarta, Indonesia; Forestry Research Institute Kalimantan (FRIK), Indonesia; Tropenbos International Indonesia and Forest Department Sarawak, Malaysia.

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