

# USE OF NATIVE SPECIES IN FOREST REHABILITATION AND CONSERVATION IN VIETNAM

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## ABSTRACT

In 1993, forest covered 9,650,000 ha in Vietnam, including: conservation areas, such as National Parks and nature reserves; protection forests, such as watersheds; coastal forests and plantations. This short communication considers the proportion of forested land in each of these categories, future plans for reforestation in Vietnam and describes species and combinations of species, which have been planted.

## INTRODUCTION

In 1993, in Vietnam, forest covered 9,650,000 ha, divided into 3 categories: special-use forest, 924,000ha (National Parks, nature reserves); protection forest, 2,798,500 ha (watershed forests, coastal forests) and production forest, 5,926,400 ha (materials for industry). Of this, plantations amounted to more than 1 million ha. Programme 327 supports plantation establishment and natural forest protection in special-use and protection forests. From 1993 to 1998, about 640,000 ha of plantations were established, averaging 110,000 ha per year. The Government of Vietnam has also launched a major programme of afforestation, with a target of five million hectares by the year 2010. In 1999, the first year of this program, about 200,000 ha of plantations were established. A list of almost 100 native tree species has been suggested for plantation establishment and forest enrichment on different scales in various ecological regions for rehabilitation and conservation.

### Use of native species in planting

#### *Pure plantations*

Tree species planted in single species plantations include *Styrax tonkinensis* (Styracaceae) and *Manglietia glauca* (Magnoliaceae) to supply pulp and timber. Other timber trees include *Erythrophloeum fordii* (Leguminosae), *Chukrasia tabularis*, *Toona surenii* (Meliaceae), *Canarium album* (Burseraceae), *Paulownia fortunei* (Scrophulariaceae), *Dipterocarpus alatus*, *Hopea odorata* (Dipterocarpaceae), *Azelia xylocarpa* and *Dalbergia* spp. Preliminary data on growth of some of these species are presented in Table 1.

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Table 1. Growth and age measurements of some native species used in single species plantations.

Species	Age	Diameter (cm)	Height (m)	Location
<i>Erythrophloeum fordii</i>	35	38.1	12.22	Tam Dao-Vinh Phuc
<i>Erythrophloeum fordii</i>	35	39.48	14.98	Cau Hai-Phu Tho
<i>Erythrophloeum fordii</i>	5	7.28	5.38	Cau Hai-Phu Tho
<i>Peltophorum tonkinensis</i>	5	8.66	6.48	Cau Hai-Phu Tho
<i>Ormosia balansae</i>	5	6.03	6.27	Cau Hai-Phu Tho
<i>Endospermum chinense</i>	5	10.81	7.94	Cau Hai-Phu Tho
<i>Castanopsis cerebrina</i>	5	12.71	7.57	Cau Hai-Phu Tho
<i>Cinnamomum ilicioides</i>	5	9.28	6.36	Cau Hai-Phu Tho
<i>Chukrasia tabularis</i>	12	12.5	11.5	Nghia Dan-Nghe An
<i>Xylia xylocarpa</i>	10	8.0	12.0	Daklak
<i>Dalbergia cochinchinensis</i>	38	29.0	21.8	Dong Nai
<i>Dalbergia bariaensis</i>	41	15.3	14.9	Dong Nai
<i>Canarium album</i>	27	5.2	14.0	Huu Lung-Lang Son
<i>Annamocarya sinensis</i>	7	8.7	5.5	Cuc Phuong-Ninh Binh

In South Vietnam, pure plantations of *Dipterocarpus alatus* and *Hopea odorata* have been established on different scales since the early 1930s, initially by Paul Maurand, a French scientist, with the help of shade trees such as *Cassia siamea* and *Indigofera teysmanii*. The method employed was very successful, leading to the establishment of new plantations with *Acacia auriculiformis* and *Leucaena* spp. as shade trees. *Dipterocarpus alatus* and *Hopea odorata* have also been planted successfully in pure plantations without shade trees in some provinces in South Vietnam such as Tay Ninh, Ba Ria and Dong Nai. In some cases, *H. odorata* has been planted at high densities (>3000 trees/ha) to promote mutual shading, competition and early, rapid growth.

#### **Mixed planting**

It was recognised that pure plantations of *Manglietia glauca* and *Styrax tonkinensis* depleted soil nutrients, causing reduced productivity in subsequent rotations. Pests and diseases also became a problem. Therefore, mixed plantings were tried. In the early 1970s in North Vietnam, *Styrax tonkinensis* was planted with *Manglietia glauca*, *Erythrophloeum fordii*, *Ormosia balansae*, *Peltophorum tonkinensis*, *Tephrosia candida* and *Prunus arborea*. The productivity of *Styrax* in mixed plantations increased by 15-20%, compared with pure stands. At the same time, *Manglietia glauca* was planted in mixtures with *Erythrophloeum fordii*, *Khaya senegalensis* and *Tectona grandis*. Two species, namely *Khaya senegalensis* and *Tectona grandis*, could not adapt well to the site, so mixed plantations became pure plantations. Only mixed plantings with *Erythrophloeum fordii* were successful, because *Erythrophloeum fordii* grew slowly in the first few years, so *Manglietia glauca* trees could develop an over-storey. However by age 10-12 years, both species reached the same height. More research is required to determine the optimum ratio

of the two species. In the early 1980's, in the northern part of Central Vietnam, *Chukrasia tabularis* was planted with *Peltophorum tonkinensis*, *Ormosia balansae*, *Michelia* sp. (*Magnoliaceae*) and *Gmelina arborea* (*Verbenaceae*), whilst in South Vietnam, *Dipterocarpus alatus* was planted with *Hopea odorata* and *Afzelia xylocarpa*. During 1976-1995, La Nga Forest Enterprise (Dong Nai) established 810 ha of mixed plantations of *Dipterocarpus alatus*, *Hopea odorata* and *Afzelia xylocarpa* and a small area of *Pterocarpus macrocarpus*, *Dalbergia* sp. and *Lagerstroemia* sp. with different density combinations.

### Conservation of native tree species

For conservation, national surveys of threatened tree species have been carried out to categorise them, according to IUCN categories (1994) (Table 2). Rare or endangered species have been propagated and planted in arboreta. However, we would like to follow the idea that "conservation is for development and development is to serve conservation". Consequently these valuable threatened tree species must be involved into forest planting and enrichment programs so that we can protect rare species from extinction.

Table 2. Threatened tree species according to IUCN categories (1994).

Species	Family	IUCN category <sup>1</sup>	Propagation method
<i>Afzelia xylocarpa</i>	Leguminosae	EN A1cd	Seed
<i>Anisoptera costata</i>	Dipterocarpaceae	EN A1cd	Seed
<i>Annamocarya sinensis</i>	Juglandaceae	CR D	Seed
<i>Aquilaria crassna</i>	Thymeleaceae	CR A1cd	Seed
<i>Calocedrus macrolepis</i>	Cupressaceae	EN D	Seed/Cutting
<i>Dalbergia annamensis</i>	Leguminosae	EN A1cd	Seed
<i>Dalbergia bariaensis</i>	Leguminosae	EN A1cd	Seed
<i>Dalbergia mammosa</i>	Leguminosae	EN A1cd	Seed
<i>Diospyros mun</i>	Ebenaceae	CR A1cd	Seed
<i>Dipterocarpus tonkinensis</i>	Dipterocarpaceae	EN A1cd	Seed
<i>Erythrophloeum fordii</i>	Leguminosae	EN A1cd	Seed
<i>Fokienia hodginsii</i>	Cupressaceae	VU A1cd	Seed/Cutting
<i>Keteleeria evelyniana</i>	Pinaceae	VU A1	Seed
<i>Madhuca pasquieri</i>	Sapotaceae	VU A1cd	Seed
<i>Pinus krempfii</i>	Pinaceae	VU A1cd	Seed
<i>Hopea cordata</i>	Dipterocarpaceae	CR D	Seed
<i>Pterocarpus macrocarpus</i>	Leguminosae	VU A1cd	Seed
<i>Shorea falcata</i>	Dipterocarpaceae	CR D	Seed
<i>Taxus chinensis</i>	Taxaceae	CR D	Cutting

<sup>1</sup> Critically Endangered (CR); Endangered (EN); Vulnerable (VU); Low Risk (LR)

### REFERENCE

IUCN, 1994. IUCN Red List Categories. Gland, Switzerland, 21pp.