ALBIZIA FALCATARIA
(PARASERIANTHES FALCATARIA)
A Newly Emerging Export Earner in Indonesia.

by
Soenardi Prasirehatmodjo

ABSTRACT

Since 1980, the wood industry in Indonesia has grown at a rapid rate. Within the course of 10 years a substantial number of sawmills and plywood mills were set up. Related industries that have also been established include blockboard, particle board, pulp and paper and rayon. Together, these industries are utilizing wood from the tropical rainforests at a rate of almost 20 million m³ a year. There are indications that wood industries will continue to grow, the latest major trend being toward the production of pulp and paper. By the year 2000 it has been estimated that the demand for wood will be around 40 million m³ and the existing tropical rainforests would definitely be unable to meet the demand.

In response to this situation, Indonesia has embarked on a massive forest plantation program which is projected to cover a total area of 6.2 million hectares within the next 15 to 20 years. Twenty different tree species have been recommended by the Ministry of Forestry for the development of these plantations. One of these species, Albizia falcataria (Parasierianthes falcataria) is discussed in this paper with regard to its nomenclature, properties, uses, availability and sustainability. The choice of this species for discussion stems from the fact that it has attained a rather unique position in the timber market that has changed its status from that of an insignificant and rather neglected species to a presently growing export earner. The tree has an extremely fast rate of growth and can grow well on poor soil. In addition, being a legume, it is able to improve soil fertility. These might be the reasons why this species has been widely planted by farmers on their farmlands as a quick yielding tree. The present promising financial prospects involved have motivated more farmers to plant this tree. This is a good development, because apart from increasing farmers' incomes, the free planting activities will have a positive impact on the environment and the sustainability of the species.

Photographs of plantations and utilization of this species will also be shown.

**Professor of Wood Science and Technology, Faculty of Forestry, Gadjah Mada University, Yogata, Indonesia.

INTRODUCTION

Indonesia is endowed with a very large forest resource. More than 60 percent, or about 145 million hectares, of the land area are covered with forests. About 60 million hectares have been designated as production forest, the rest consist of production forest, nature reserves, conservation forests, recreation forests, etc.

For more than a century, forest development in Indonesia has been concentrated in Java. This is related to the existing valuable forest resource on this island, i.e. teak. Although non-teak forests are also growing here, major interest has been paid to teak, primarily because of its established position, both in the domestic and international market.

At the end of the 1960s there was a drastic change in forest development in the country. In an attempt to obtain revenue from the forest resource to finance national development programs, the Government opened the tropical rainforests in the outer islands of Java for capital investment. In a very short time there was a big flow of domestic and foreign capital invested in logging operation by concession holders. This sudden flow was caused by the rapid increase in demand for timber in Japan and Korea in particular, that could not be met by Malaysia and the Philippines.

As a result, in less than 10 years there was a rapid increase in production and export of timber. From a production of about 2 million m^3 in 1966, there was a rise to 24 million and 19 million m^3, respectively, in 1973 (Anon. 1973). Until 1980, timber production varied from 14 to 25 million m^3 and export from 14 to 20 million m^3 a year. Unfortunately, for more than 10 years export of timber was largely in the form of logs and very minor in the form of finished products (Anon. 1985).

In an attempt to persuade concession holders to establish forest industries, the government restricted the import of logs in 1980 and in 1985 it was completely banned. The result of these regulations was joined very dramatic. Since 1980 there has been a burst in the development of forest industries with emphasis on the establishment of plywood mills. Right now there are in total 364 sawmills (not including the small ones) and 121 plywood mills (Hassan, 1992). Other mills such as blockboards, particle boards, pulp and paper, rayon have also been set up. As a result, from 1985 to 1989 export earnings from forest products rose from US $1.37 billion to US $3.789 billion.

All these developments, however, are not without concerns about the possibility of short supply of timber in the long run. By the year 2005, demand for wood is estimated to be at the rate of 90 million m^3 per year, and the existing natural forests (the tropical rainforests) will definitely be unable to meet the demand (Anon. 1987).

In response to this situation, steps have been taken by the Ministry of Forestry to develop industrial forest plantations with a target area of 4.4 million hectares for the next 10 to 20 years. Eventually the plantation forest, including

the 1.8 million hectares already established, will cover a total area of 6.2 million hectares that in due time is expected to supply the required 90 million m$^3$ of wood annually, consisting of wood for fiber, construction and energy.

Development of plantation forests

Despite all the arguments and disagreements on what species to plant and for what purpose, the Ministry of Forestry finally announced a list of recommended species for the industrial forest plantations (Anon. 1986; 1987) as follows:

<table>
<thead>
<tr>
<th>Botanical name</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acacia auriculiformis</td>
<td>Akasia</td>
</tr>
<tr>
<td>Acacia mangium</td>
<td>Mangsam</td>
</tr>
<tr>
<td>Agathis spp.</td>
<td>Danar</td>
</tr>
<tr>
<td>Albizia falcataria (Paraserianthes falcataria)</td>
<td>Jenajing</td>
</tr>
<tr>
<td>Anacardia spp.</td>
<td>Araukaria</td>
</tr>
<tr>
<td>Dalbergia taracea</td>
<td>Sosokeling</td>
</tr>
<tr>
<td>Diospyros celebica</td>
<td>Kayu bitam</td>
</tr>
<tr>
<td>Dipterocarpus spp.</td>
<td>Keroning</td>
</tr>
<tr>
<td>Dryobalanops spp.</td>
<td>Kapur</td>
</tr>
<tr>
<td>Eucalyptus deglupta</td>
<td>Leda</td>
</tr>
<tr>
<td>Eucalyptus roophylla</td>
<td>Ampupu</td>
</tr>
<tr>
<td>Gymnophyllum hongerinus</td>
<td>Ramin</td>
</tr>
<tr>
<td>Macaranga kauki</td>
<td>Sawo lecik</td>
</tr>
<tr>
<td>Pemeno connexors</td>
<td>Sungkai</td>
</tr>
<tr>
<td>Pinus merkusii</td>
<td>Tisam</td>
</tr>
<tr>
<td>Pometia spp.</td>
<td>Matos</td>
</tr>
<tr>
<td>Sosnowitzum album</td>
<td>Gatos</td>
</tr>
<tr>
<td>Shorea spp.</td>
<td>Meresti</td>
</tr>
<tr>
<td>Swietenia spp.</td>
<td>Mahoni</td>
</tr>
<tr>
<td>Toona grandis</td>
<td>Jati (Teak)</td>
</tr>
</tbody>
</table>

Right now there is a tendency to include two new species into the list, i.e. Dioubenyo mollucorum and Lophopetalum because of their successful planting trials. Of course there are other new species that have also changed in status such as Paramortis coccon (sungkai) and Hevea brasiliensis (rubberwood), but the change is less impressive in comparison to that of falcataria.

The established 1.8 million hectares of plantation forests originated from earlier reforestation programs. The largest area of these is teak (≥ 1 million hectares), followed by Pinus merkusii (≥ 750,000 hectares), and other small plantation areas such as Agathis, Swietenia, Albizia falcataria, Albizia excelsa, Dalbergia taracea, etc.


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This paper is intended to discuss one of those plantation species, i.e. Albizia falcataria (or Paraserianthes falcataria) because of its present unique position in the timber markets, that has changed its status from that of an insignificant and rather neglected species to a dependable export canopy.

The species Albizia falcataria (Paraserianthes falcataria)

a. Nomenclature

Paraserianthes falcataria Nielsen was formerly known as Albizia falcataria (L.) Backer or Albizia falcata (L.) Fosberg. In Indonesia it is known as jerning of argon, in the Philippines as buah, in Burma as pushu, and in Sarawak Malaysia as mahu (Marulajaya, 1977).

There has been some confusion among foresters which name to use: Albizia or Albizia, falcata or falcata. Fosberg (1965) indicated that the correct name is Albizia falcataria. It was also indicated that this species had already been known as Albizia nobilisca by Mist until Backer introduced the incorrect name Albizia falcataria Backer (Giffen, 1954). This species was found by Temman in the island of Banda (East Indonesia) then brought over to the Botanical Garden in Bogor to later on be dispersed throughout the Indonesian Archipelago (Nayme, 1950).

Albizia falcata (L.) Backer as well as Albizia falcataria (L.) Fosberg are synonyms of Paraserianthes falcataria Nielsen (Whitmore, 1966), a name that was earlier given to the species by Nielsen, but unfortunately not widely known.

It is therefore more appropriate to use this name for scientific communication.

b. Distribution and growth

Distribution and growth of Albizia falcata has been discussed in a report by the National Academy of Sciences (Anon, 1979). Hoyne (1950) indicated that Paraserianthes falcataria is one of the fastest growing species in the tropics. It is native to the eastern islands of the Indonesian archipelago (notably the Moluccas) and in the Marianas (West Indies). However, in the 1970s it was spread throughout South East Asia, from Burma (Myanmar) to the Philippines.

The tree can grow so fast that it has been called a miracle tree. Measurements from plantations in the Hawaiian islands (on Kauai and Kauaii), in Malaysia, Indonesia (Java and Kalimantan) and in the Philippines showed that on good sites with adequate rainfall, trees can reach 7 m in height in little more than a year, 1.5-18 m in 3 years, 21 m in 4 years and 35 m in 9 to 10 years. After this upward growth slows down and the final height varies from about 45 m. The tree can reach a diameter of 1 m at the age of 20 to 30 years if it lives without attack or other diseases.

Plantation of this species is extremely productive on good sites. The trees can be closely spaced (1000-2000 trees per ha) as the stems can grow straight and the crown of foliage can close quickly and create shade for other crops. In spacing and fertilizer mix, young plantations have usually produced in excess of 50 m² per ha. But a mean annual increment of 25-40 m² per ha is a 8-12 year rotation.

is a more likely expectation. The trees also coppice vigorously so that (at least for some products) replanting is not necessary after the first harvest.

Because of its fast rate of growth the tree can be regarded as a cash crop. Hence, in Java it has been widely planted by farmers on their farmland as a quick yielding tree, planted in between other trees or as shade trees of other crops or as boundary trees. The tree has quite often also been planted as shade trees in coffee, tea and other plantations of estate crops.

Another advantage is that it has also the ability to grow rapidly on infertile soils that are not waterlogged. It also tolerates acid soils to pH 4.5. Hence, it has been widely used for reclamation programs of critical lands on submerging sites like flood and demounded hill lands.

In Java the tree can grow at elevations of up to 1500 m above sea level (Griiffen, 1954), but it can also thrive at an elevation of 18 m above sea level. The best elevation seems to be around 300-500 m above sea level. Hence most trees are planted on hill sites.

1. Properties and uses

The properties and uses of this species has been discussed at length by Sutigno (1987). The wood is light-colored (white) or reddish brown, but both kinds of wood come from the same species. The reddish brown colored wood is cut from the heartwood while the white colored one from the sapwood or from a tree filled before heartwood formation which is believed to commence at the age of 8 to 12 years depending on the site quality (Panniti, 1988). The better the site quality, the later is the start of heartwood formation. The faster growth on better sites seems to postpone heartwood formation. Hence, when light colored wood is desired (which is preferred by the export market) the time of felling should take this into account. Despite its white color the wood is less susceptible to blue stain compared to rubberwood of rainia.

The wood is easy to saw, but it gives rough (woolly) surfaces even after planning, most probably caused by interlocked grain. In order to get a smooth surface the wood should be seasoned carefully which would throw a beautiful figure, especially on the outer sawn surface.

The wood is neither strong nor durable. In specific gravity varies from 0.34 to 0.49 (average 0.35). Despite its low durability it is relatively resistant to dry termites (Coptotermes sp). In past the wood was mainly used for packaging, e.g. packaging of paper, tea, resin and other products. Later on it was widely used for rural housing. When feed from moisture the performance is quite good. Since resistance to termites is quite good, houses made out of this timber are still in good condition after 30 years. Ganging nail construction for houses has also been tried with good results.

The wood is also used for mixing cheap furnitures such as chairs, tables, bookshelves, beds etc. This type of furniture is normally paufied prior to using.

Many Balinese artists are making wooden artifacts from this wood.

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In 1970 the wood was used successfully for making wood wool cement board. The wood wool was first soaked in water for one day. Unfortunately, this kind of product did not attract many users.

In 1980 the wood was first used for particle boards. The boards are more resistant to termites than those made out of rubberwood. The use of the wood for plywood started in 1970 by small factories that were also making blockboards. The plywood is used for containers, cabinets, and sewing machines, etc.

Some paper mills are also using this wood for pulp manufacture by the sulphate process. For papermaking the pulp is mixed with long fibers of softwood, but for corrugated boards the wood can be used without being mixed. Three-year-old trees can be used for pulp without any significant difference in properties from pulp made out of 5-year-old trees. Small branches and twigs are included in the pulping process.

Some export of the wood was started in 1960 in the form of boards in surfaced and dry condition, but the volume was very small. The latest most fascinating development is the export of edgedjointed boards (laminated boards) using area formaldehyde glue. Logs are sawn into boards (16 x 12 x 210 cm), kiln-dried (to a M.C. of 15%), planed and broken down into strips (204 cm), finger-jointed and then edge-jointed in a composer (4x8") and sanded. This kind of product is exported mainly to Japan at a price of US $ 200 per m3. Light-colored wood is preferred for the export product. However, there are also export of other finished products.

The export business of the wood seems to have attracted quite a few investors. Right now, in Java alone, there are 62 firms involved in the processing and export of this wood. Realization of export in 1989 amounted to 39,800 m3 with a total value of US $ 13,862,100. This is indeed quite an achievement for a species like Paranariuflora, a non-commercial species. The export boom has resulted in the increase of the local price of log from US $ 10.5 to US $ 23.5 per m3 (for clear boles of 2 m length with a minimum diameter of 20 cm). Boles with a diameter of 50 cm can sell as high as $ 32,50/m3 (length of bole 2 m). (Anon, 1988 b).

d. Availability and sustainability

It is rather difficult to assess the availability and sustainability of the species because most trees are planted by farmers on their farmland with no fixed rules with regard to spacing, age of trees, etc. Hence, stocking is difficult to estimate. All that can be estimated is that farmlands planted with Parajarium trees covers an area of not less than 150,000 ha (in Java alone) (Anon, 1989 b). But since the stocking is quite variable it is difficult to estimate the potential production of wood. On the other hand, total plantation of this species in state forests covers an area of only 5,000 ha. With a rotation of 10 years the production is around 263 m3 per ha (Slavant, 1990). It is only interesting to note
that the present promising financial prospects involved in planting this species have attracted more farmers to participate. Some of them even convert their farmlands into a plantation of *Paraserianthes falcaria* with the expectation to get more income from their land. With an investment of equivalent to US $ 750 per ha a farmer could obtain US $ 7500 after 5-6 years (see Appendix). This could definitely not be equalized by the interest of any bank deposit.

In short, planting *Paraserianthes* seems to be a highly profitable undertaking. There is no doubt that availability and sustainability of the tree is secured by the active planting operations that are also spreading out to the outer islands like Sumatra, Kalimantan and Sulawesi. In addition, these tree planting activities would definitely have a positive impact on the environment.

**Conclusion**

*Paraserianthes falcaria* is one of the species that has been recommended by the Ministry of Forestry to be planted in the development of industrial forest plantations. This species has actually been cultivated for quite some time, but in the past it remained as an insignificant timber producer. The wood is neither strong nor durable, hence it has a reputation only as "the poor men's timber". It is only because of its good characteristics in oil field that it has been so widely planted especially by the farmers: easy to reseed, has a fast rate of growth, can improve soil fertility, can be used as shade trees, and also a multipurpose tree species.

It was only recently that the wood attracted buyers abroad because of its specific properties (light color and light weight) that could satisfy a lot of end uses. Export of the wood in the form of various products has therefore increased considerably during the past few years. As a result, planting of the tree by farmers has expanded in a short time. Business in planting *Paraserianthes* appears to be highly profitable, hence it has attracted more farmers to join the planting which is good for the betterment of the environment and the sustainability of the species.

**REFERENCES**


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Heyne, K. 1950. Useful Plants of Indonesia. van Hecke, the Hague, Bandung (in Dutch).
Appendix

Cost Benefit Analysis of Business in Planting *Panam Comes* *sikkimensis*
Based on Experience of Farmers in Bogor and Sukabumi (West Java)

A. Material input
1. Seedlings 1,660 x Rp 100.00 = Rp 166,600.00
2. Fertilizer (NP) 500 g x 100 = 50,000 g
150 g x 200 x 1,666 trees x Rp 250.00 = Rp 208,250.00

B. Labor input
1. Digging holes 87 trees x Rp 1500.00 = Rp 130,500.00
2. Planting 42 trees x Rp 1500.00 = Rp 63,000.00
3. Fertilizing 20 trees x Rp 1500.00 = Rp 30,000.00

C. Land most years x Rp 150,000.00 = Rp 90,000,000.00

Total cost = Rp 1,468,350.00

D. Harvest and income
1. Number of trees for harvest:
   90% x 1,666 = 1,499

   Income: 1,499 x 0.5 m² x Rp 22,000.00/m³ = Rp 1,649,000.00

   Profit: Rp 16,490,000.00 - Rp 1,468,350.00 = Rp 15,000,650.00

   UC Ratio: 16,490,000.00 / 1,468,350.00 = 11.23

Note:
1. Application of fertilizer 4 x in 2 years (150 g N, 100 g P, 150 g K, 200 g S per tree).
2. Harvest at the age of 6 years.
3. Spacing of trees 3 x 2 m (or 2 x 2 m); thinning at the age of 4 years, the spacing is widened up to 12 x 3 m.
4. Speed of digging holes = 25 holes/day
5. Until 2 years cash crops can be planted in between the rows.
6. Cost of tending and weeding not required, but done by farmers at no cost.


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