

CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES  
OF WILD FAUNA AND FLORA



Fourteenth meeting of the Conference of the Parties  
The Hague (Netherlands), 3-15 June 2007

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

*Dalbergia retusa* is proposed for listing in Appendix II of CITES in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24 (Rev. CoP13) Annex 2 (a), Paragraph B.

*Dalbergia granadillo* is proposed for listing in Appendix II of CITES for look-alike reasons in accordance with Article II, paragraph 2(b), of the Convention and Resolution Conf. 9.24 (Rev. CoP13) Annex 2 (b), Paragraph A.

B. Proponent

Germany, on behalf of the European Community Member States acting in the interest of the European Community. (This proposal has been prepared by The Netherlands.)

C. Supporting statement

1. Taxonomy

- 1.1 Class: Magnoliopsida
- 1.2 Order: Fabales
- 1.3 Family: Leguminosae (Fabaceae) Juss. 1789
- 1.4 Genus, species or subspecies, including author and year: *Dalbergia retusa* Hemsley and  
*Dalbergia granadillo* Pittier

Taxonomic categorisation of the genus is difficult and estimates of the total number of species vary between 100 and 200 (CITES, 1992).

- 1.5 Scientific synonyms: Synonyms of *Dalbergia retusa*:
- Amerimnon lineatum* (Pittier) Standl.  
*Dalbergia hypoleuca* Pittier  
*Dalbergia lineata* Pittier  
*Amerimnon retusum* (Hemsl.) Standl.

Note: *Dalbergia retusa* Baill. is a synonym of *Dalbergia obtusa* Lecomte; Rudd (1995) combined *D. hypoleuca*, *D. lineata*, *D. pacifica* and *Amerimnon cuscatlanicum* as varieties of *D. retusa*.

1.6 Common names:	English:	Black rosewood, Nicaraguan rosewood, Red foxwood, Rosewood, Yellow rosewood
	French:	palissandre cocobolo
	Spanish:	cocobola, cocobolo, cocobolo ñambar, cocobolo negro, cocobolo prieto, funera, franadillo, granadillo, granadillo de Chontales, manarizoby, namba, nambar, nambar de Agui, nambar legitimo, nambaro, palisandro, palo negro, palo de rosa, prieto
	German:	Cocoboloholz, Foseholz

In trade, *Dalbergia retusa* has the same common names as *D. granadillo*, and other *Dalbergia* spp. (Schmidt, 2006).

1.7 Code numbers: ---

## 2. Overview

*Dalbergia retusa* is a hardwood leguminous tree, principally occurring in tropical dry forests (Section 3.2). This endangered ecosystem has been heavily exploited, with most of the land having been converted to other uses (Section 4.1). In addition to this pressure, *D. retusa* has been extensively felled, like many of the other tree species in the genus, to harvest the beautiful, dense and durable wood, which is prized for a wide range of uses (Section 6.1). There appears to be a high wastage of wood as the sapwood is of low value and there is a premium on the most highly patterned heartwood pieces (Section 6.3). The wood is used for carvings and presumably exported as personal items in the tourist trade (Section 6.1). The wood is also reported in trade outside the range States, particularly in the United States of America, where it appears to be imported as timber and then sold on as timber or small, high value products such as pen-blanks and gun handles (Section 6.1). Some plantations of the species exist at various stages of maturity, and more are planned to attempt to fulfil demand for the timber (Section 8.4) although destructive harvest from the wild continues (Section 6.1). Little information is available on current abundance, but there are reports of heavy exploitation in the past, particularly in Costa Rica and Panama (Section 4.2). Reported difficulties in sourcing the wood (Section 4.2) suggest that it may already be commercially extinct in some wild areas.

Given the increasing importance of tourism in the region, the prominence of carvings in the tourist trade, the continuing demand for the wood for a range of uses internationally and the high level of wastage, the total trade may represent utilisation of a great many trees.

This document suggests that *Dalbergia retusa* meets the criteria for inclusion on Appendix II of CITES in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24 (Rev. CoP13) Annex 2 (a), Paragraph B: *It is known, or can be inferred or projected, that regulation of trade in the species is required to ensure that the harvest of specimens from the wild is not reducing the wild population to a level at which its survival might be threatened by continued harvesting or other influences.* *Dalbergia granadillo* is also proposed for inclusion for look-alike reasons as the timber is also traded as "cocobolo" and the timber of the two species cannot be distinguished.

## 3. Species characteristics

### 3.1 Distribution

*Dalbergia retusa* occurs from Mexico to Panama (INBio, 2006) mainly in dry tropical forest. The distribution is likely to be highly fragmented due to the massive loss of this ecosystem (Section 4.1). The type location is Paraíso in Panama (INBio, 2006).

*D. retusa* has been reported from north-western Colombia (Record, 1942; TROPICOS, 2006). In Costa Rica, it occurs throughout the Nicoya Peninsula, and in the vicinity of Pozón-Orotina, San Pablo and San Pedro de Turraabares and the city of Colón, but is very scarce in the northern zone of Los Chiles (INBio, 2006; ITCR/EIF, 2006). In Costa Rica, *D. retusa* occupies 13,697.7km<sup>2</sup>. Its available habitat has been reduced by 61.5%, indicating the species is

exploited and rare. 6.2% of its habitat occurs within State protected areas. Occurs from 50-300m, in dry, warm to very warm areas, with less than 2,000mm annual precipitation. It occurs principally within the dry forests of Guanacaste province and in the driest areas of the Nicoya Peninsula within the province of Puntarenas. It generally grows in flat to moderately flat areas with slopes less than 15% and occasionally in rocky areas (ITCR/EIF, 2006). Representative specimens have been reported from El Salvador (MOBOT, 2006). Included in a list of principal forest species of Guatemala (INAB, 2006). Reported from western Honduras (Record, 1942). Grows in south-western (Record, 1942) and south-eastern (ILDIS, 2005) Mexico. It is frequent in Nicaragua from the Pacific to the Atlantic coasts (Stevens *et al.*, 2001). In Panama, it is only found in the drier, southern parts of the isthmus, but is never common (Condit and Pérez, 2002). *Dalbergia granadillo* occurs in El Salvador and Mexico (Secretaría de Desarrollo Social, 1994).

### 3.2 Habitat

*D. retusa* is a species of dry forest, woodland and scrub along central American Pacific coastal lowlands and slopes, occurring in wooded areas as well as rocky ground and pastureland (Jiménez Madrigal, 1993). In Nicaragua, the species is found in a range of habitats, including dry forests, humid forests, gallery forests and savannas (Stevens *et al.*, 2001).

*D. retusa* is found on flatlands or moderate slopes in tropical dry forests with an annual rainfall under 2000 mm and a temperature range of 24 - 30°C (Marín and Flores, 2003). It grows in soils of varying pH, texture, drainage and fertility, with a typical elevation range of 50 - 300 m (INBio, 1999; Marín and Flores, 2003) and up to 800 m in Nicaragua (Stevens *et al.*, 2001).

The species responds well to fire (Section 3.3). It is slow-growing (Americas Regional Workshop, 1998) but has shown a high rate of survival, for example in Costa Rica, in a tropical dry site (Piotto *et al.*, 2004) and on acid soils in a tropical humid site (Tilki & Fisher, 1998).

### 3.3 Biological characteristics

The trees flower between January and May after 4 to 5 years, with a second flush in August and September (INBio, 1999; Marín and Flores, 2003 and references therein). Flowers are insect-pollinated and seeds with intact fruits are wind-dispersed (Bawa and Webb, 1984). Flowers are arranged in racemes, clustered towards branching tips, appearing as terminal or axillary panicles; the pod is an indehiscent, one-seeded samara.

*D. retusa* appears to be self-incompatible and shows high levels of seed abortion. In a pollination study by Bawa and Webb (1984), only 8% of 560 open-pollinated flowers developed mature fruits, none of the 184 self-pollinated flowers set fruits and 64% of the 137 cross-pollinated flowers set fruits. Pollen is dispersed by bees (Frankie *et al.*, 2002) and seeds are dispersed by wind and water (Marín & Flores, 2003). Seeds are orthodox and remain viable for up to 5 years with 60% germination if stored at 6 - 8% moisture at 5° C (Marín & Flores, 2003). Up to 80% germination has been observed in nurseries (INBio, 1999).

Natural regeneration of the species is scarce, however saplings and juveniles are numerous in areas periodically exposed to fire (Jiménez Madrigal, 1993; Marín & Flores, 2003).

### 3.4 Morphological characteristics

The species grows to about 20 m (Ricker & Daly, 1997) with a diameter of 40 cm (INBio, 1999). The heartwood is surrounded by white sapwood. The sapwood, which is as dense as the heartwood, will vary in amount depending on the age of the tree and the conditions of its habitat. The poorly formed stems yield the most uniquely figured and highly prized wood (Cocobolo, 2006).

The wood is hard, heavy and lustrous in colour (Condit & Pérez, 2002). It has a basic specific gravity (oven dry weight/green volume) from 0.80 to 0.98 and the air-dry density is between 750-1000 kg/m<sup>3</sup> (Marín & Flores, 2003). The heartwood varies from yellow to dark reddish-brown in colour, with a figuring of darker irregular markings. It is faintly fragrant (Titmuss and

Patterson, 1988) with no distinctive taste (SCMRE, 2002). The amount of figure and contrasting colour varies widely from tree to tree. (Cocobolo, 2006). It has a fine to medium texture and a straight to irregular grain (Echenique-Marique & Plumpre, 1990). The wood has a natural cold feel like marble (Titmuss & Patterson, 1988), with a high oil content and a high natural polish (Marín and Flores, 2003). Because of the oil content, it is easy to work and polish and is highly durable (Record, 1942). The oils offer a waterproofing property, which give it an esteemed position in the cutlery trade (SCMRE, 2002). Dust from working the material may produce a rash or dermatitis resembling ivy poisoning (Record & Hess, 1943).

Numerous photographs of the wood are available on the web (Hobbithouseinc, 2006).

### 3.5 Role of the species in its ecosystem

The species is associated with *Tabebuia ochracea*, *Astronium graveolens*, *Tabebuia impetiginosa*, *Sideroxylon capiri* and *Swietenia macrophylla* (Jiménez Madrigal, 1993).

*D. retusa* is a highly attractive bee plant in Costa Rica, where up to 60 species of bees visit the flowers (Frankie *et al.*, 2002). *Dalbergia* species form nitrogen-fixing nodules and therefore have an important role in enhancing soil fertility (Rasolomampianina *et al.*, 2005). Cutting of *D. retusa* trees for timber could mean that they will no longer provide these ecosystem functions.

## 4. Status and trends

IUCN Global threat status: VU A1acd (assessed by Americas Regional Workshop, Conservation and sustainable management of trees project in 1998). For threat category definitions, see [http://www.iucnredlist.org/info/categories\\_criteria1994](http://www.iucnredlist.org/info/categories_criteria1994).

### 4.1 Habitat trends

The tropical dry forests of Central America, the main habitat for *D. retusa*, have been subject to human influences such as hunting and modification of the vegetation cover for as long as 11,000 years (Murphy and Lugo, 1995). Relatively high population densities have subjected dry forest ecosystems to massive disturbances, such that most, if not all, of the surviving forest has least been affected by the harvesting of trees, as well as by grazing in the understory (Murphy and Lugo, 1995).

Conversion of tropical dry forest to agriculture and pasture is occurring at alarming rates (Manuel Maass, 1995) and it is considered to be the most endangered major tropical ecosystem, with less than 2% remaining intact (Janzen, 1988). Less than 0.1% of the original dry forest has conservation status in Pacific Mesoamerica (Manuel Maass, 1995).

In general, the rate and extent of deforestation in the range States is very high. FAO report that the annual rates of forest cover change between -0.4% (Colombia) and -4.6% (El Salvador) for the range States between 1990 and 2000 (Table 1; FAO 2005).

Large-scale dry forest restoration studies have been undertaken in Guanacaste, Costa Rica, with the goal of re-establishing 70,000 ha of dry forest and associated habitats (Murphy & Lugo, 1995).

Table 1. Forest cover change in *D. retusa* range States, according to FAO (2005)

Country	Forest cover change 1990-2000	
	Annual ('000 ha)	Annual rate (%)
Colombia	-190	-0.4
Costa Rica	-16	-0.8
El Salvador	-7	-4.6
Guatemala	-54	-1.7
Mexico	-631	-1.1
Honduras	-59	-1.0
Nicaragua	-117	-3.0
Panama	-52	-1.6
<i>Belize</i> <sup>1</sup>	-36	-2.3

<sup>1</sup> Information is needed to confirm if Belize is a range State.

#### 4.2 Population size

In 1979, *Dalbergia* was described as scarce, all accessible stands of the genus having long since been logged out (NAS). Much of the habitat that should be available to *D. retusa* has been destroyed or heavily exploited (Section 4.1). Some areas where the species was formerly widespread now hold populations which are almost completely exhausted (Americas Regional Workshop, 1998). This is most notable in Costa Rica (Americas Regional Workshop, 1998; Jiménez Madrigal, 1993). Continuing habitat destruction, the growth of cattle ranching and increasing fires have all contributed to the decline in the species (Americas Regional Workshop, 1998).

Cocobolo is so rare that very little of it reaches the world market; it has been heavily exploited and is now mainly harvested from private fincas (farms) where 80 to 100 year old trees have been able to mature (Cocobolo, 2006).

#### 4.3 Population structure

Little information is available on the current status of population structure for the species. However, it is likely that many populations are of lower density than in the absence of logging and that mature trees will have been preferentially felled for their greater amount of heartwood. The flowers of *D. retusa* are self-incompatible and dependent on pollination by bees (Section 3.3). It is therefore likely that a minimum population density is required for regeneration of the species and that this is at risk from excessive logging.

#### 4.4 Population trends

The combination of habitat loss (Section 4.1) and cutting (Section 4.2) has resulted in a decline in the populations of the species. Exploitation as a timber is intense and areas where the species was formerly widespread are almost completely exhausted; this is most notable in Costa Rica. Continuing reductions are caused through cattle ranching and burning (Americas Regional Workshop, 1998). Intensive commercial harvest of the timber for at least 100 years, combined with artisanal harvest and its distribution is thought to have made it a scarce resource in Panama (Velásquez Runk *et al.*, 2004).

#### 4.5 Geographic trends

The species is threatened in Costa Rica and has a high risk of becoming endangered due to the drastic decrease in its populations (INBio, 2006). Prohibition of cutting standing trees of this species has been proposed (Varela Jiménez and Rodríguez Coffre, 2005). Populations of a reasonable size remain in Mexico (Americas Regional Workshop, 1998). In Nicaragua, it was

recently described as 'frequent' (Stevens *et al.*, 2001) and is considered a low priority species in the Forestry Action Plan of Nicaragua (Ampié and Ravensbeck, 1994). Once considered plentiful in some parts of Panama (Standley, 1928), it is now endangered in the country (Melgarejo, 2005).

## 5. Threats

Felling of mature, reproducing individuals and the corresponding reduction in population size and population density threatens the capacity of *D. retusa* populations to regenerate (Section 4.3). Additionally, the habitat is under continuing pressure, particularly from increasing agriculture, cattle ranching and burning (Americas Regional Workshop, 1998; Section 4.1).

## 6. Utilization and trade

### 6.1 National utilization

Only the heartwood of *Dalbergia* timber species yields quality timber; the sapwood is of little value. The trees are slow in forming heartwood, so even large logs lose much of their volume when the sapwood is removed (NAS, 1979). Because of its scarcity and high value, *D. retusa* is used for its rare beauty rather than for its extreme strength or durability (Cocobolo, 2006). Most internationally traded timber now comes from plantations (Section 8.4), although historically large volumes of the wood were extracted from the wild. Standing trees are felled for artisanal use, with at least 50% of cocobolo extraction for commercial carving being via destructive harvest in Darién, Panama (Velásquez Runk *et al.*, 2004).

*D. retusa* is exceptionally good for marine use. The timber secretes compounds toxic to bacteria, fungi, algae, termites, mosquito larvae, confused flour beetles and marine borers (NAS, 1979).

The wood is used for inlay work, musical and scientific instruments, tool and cutlery handles and other crafts (Americas Regional Workshop, 1998; Echenique-Marique and Plumptre, 1990; Flynn, 1994; Ricker and Daly, 1997; SCMRE, 2002). For brush backs, butts of billiard cues (SCMRE, 2002), decorative and figured veneers, parquet floors, hunting bows, automobile dashboards (Cocobolo, 2006), jewellery boxes, canes, buttons and chessmen (Kline, 1978). In Costa Rica the species is considered a precious wood with a high commercial value. Previously it was used to make furniture, floors, tiles and visible beams, but because of its progressive disappearance its use has been reduced to handicrafts such as statues, picture frames, jewellery etc. Trade is very small and it is not exported (ITCR/EIF, 2006).

*D. retusa* is used for making woodwind instruments such as professional quality clarinets. Although most professional quality clarinets are made of African Blackwood (*D. melanoxylon*), *D. retusa* is said to produce a softer tone. Due to the stresses placed on woodwind instruments, a professional instrument has a lifespan of approximately six years. This means that even with a consistent number of players, there is a steady demand for the wood (Jenkins *et al.*, 2002). Guitar suppliers recommending cocobolo as a substitute for Brazilian Rosewood include:

[www.cbguitars.com](http://www.cbguitars.com)

[www.benjaminiguitars.co.uk](http://www.benjaminiguitars.co.uk)

[www.alliedlutherie.com](http://www.alliedlutherie.com)

The Wounaan and Emberá indigenous peoples of Darién, Panama, have carved cocobolo commercially for about 30 years, although they have a longer tradition of carving the wood for personal household items (Velásquez Runk *et al.*, 2004). The shavings and sawdust create colour ranging from light brown to black (Velásquez Runk *et al.*, 2004), and the wood is used to produce a dye for local use in Ipeti and Nurna, Panama (Dalle & Potvin, 2004) and in Darién province, Panama (Velásquez Runk *et al.*, 2004).

## 6.2 Legal trade

Only small quantities of timber reach the world markets (Titmuss & Patterson, 1988). This limit to supplies has led to high prices in the international market (Flynn, 1994). Cocobolo is so precious that it is often sold by the pound (TATF, no date).

A search on eBay (United States of America) for "cocobolo" (<http://search.ebay.com>, 13 February 2006) listed 944 relatively small, high quality wood items and small quantities of sawn timber suitable for the production of high quality items (pens, gun handles etc.). Many of these items were being sold within the United States, demonstrating that international trade of the species into the United States occurs. It is a popular material for pens. A manufacturer in the United States of America of wooden handgun grips states that most of the cocobolo wood they use comes from Nicaragua.

Suppliers on the Internet (January to February 2006), trading variously in lumber and finished products, include:

<http://www.amazonexotichardwoods.com>  
[www.anexotichardwood.com](http://www.anexotichardwood.com)  
[www.cocobolo.net](http://www.cocobolo.net)  
[www.cocoboloinc.com](http://www.cocoboloinc.com)  
[www.cocoboloking.com](http://www.cocoboloking.com)  
[www.cookwoods.com](http://www.cookwoods.com)  
[www.gilmerwood.com](http://www.gilmerwood.com)  
<http://www.jeswoodcrafting.com>  
[www.maderasbarber.com](http://www.maderasbarber.com)  
<http://jdominik.rearviewmirror.org/wood/cocobolo.html>  
[www.southernlumber.com](http://www.southernlumber.com)  
[www.woodgrips.com](http://www.woodgrips.com)  
[www.woodshopcala.com](http://www.woodshopcala.com)  
[www.yukonlumber.com](http://www.yukonlumber.com)

Internet suppliers of seeds and seedlings include:

[www.sunshine-seeds.de](http://www.sunshine-seeds.de) and [www.agroforester.com](http://www.agroforester.com)

ITTO (2004) does not report any export trade in *Dalbergia retusa*, although five of the range States (Colombia, Guatemala, Honduras, Mexico, Panama) are ITTO members. Similarly, ITTO does not report any import trade despite the evidence (see 6.1) of trade in the species in the United States, which is an ITTO member, but not a range State.

## 6.3 Parts and derivatives in trade

The heartwood is traded, but the sapwood is of little value (NAS, 1979). The species is traded as sawn wood and as finished items manufactured from timber in the range States. Usage is highly selective for the best-patterned pieces, with reports of only 2% being used (<http://www.esmeralda.cc>).

## 6.4 Illegal trade

*D. retusa* is poorly protected, with few of the range States including special legislation on the species (Section 7). It follows that trade in the species is neither monitored nor regulated.

## 6.5 Actual or potential trade impacts

*Dalbergia retusa* is used for its beautiful high value wood to make luxury items. There is some local use, but given the range States are all developing countries it seems likely that most timber or products made from timber of this species are traded internationally. International trade is therefore likely to be promoting exploitation of the species for timber.

## 7. Legal instruments

### 7.1 National

Populations are contained within protected areas in **Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua** (Section 8.5). *D. retusa* is included (without category) in the national red list of threatened plants of **Guatemala** (Szejner, 2005) and has been protected in **Costa Rica** since 2001 (Exp. No. 14.356). It is included on the list of species for which felling should be prohibited **Costa Rica** (Varela Jiménez & Rodríguez Coffre, 2005).

### 7.2 International

*Dalbergia retusa* is not protected under any international legal instruments.

[NB *Dalbergia nigra* was included in CITES Appendix I in 1992].

## 8. Species management

### 8.1 Management measures

Extraction in **Guatemala** is regulated through management plans that comply with technical requirements and national legislation that guarantee the survival of the species (Szejner, 2005). The species has been investigated for reforestation in **Panama** (Wishnie *et al.*, 2002). It was included in a 10-year reforestation programme, commencing in 2003, for 4,000 ha of former pastures in **Nicaragua** (Anon, 2005).

### 8.2 Population monitoring

There are no population monitoring reports published for this species in any of the range States.

### 8.3 Control measures

#### 8.3.1 International

---

#### 8.3.2 Domestic

---

### 8.4 Artificial propagation

*Dalbergia* trees are slow growing, but due to the value of their timber, NAS (1979) recommend that efforts be made to extend their cultivation. During trials in a dry tropical region in **Costa Rica**, they exhibited good growth in height and good productivity when compared to six other native slow growth species that were also planted in pure and mixed plantations (Piotto *et al.*, 2004). The good form of this species and its high timber value could compensate for the relatively low annual increments in volume, especially if grown in mixed plantations (Piotto *et al.*, 2004). However, in Central America the overwhelming majority of plantations are of teak, with only 10% of plantations in **Costa Rica** consisting of native species (Schmincke, 2000).

The Forest Stewardship Council lists two organisations that maintain plantations including *D. retusa* holding their certificate in forest management, in **Costa Rica** and **Nicaragua** (FSC, 2006).

Most of the cocobolo available today is not cut from the natural rainforest, but from privately owned fincas with trees planted 80 to 100 years ago (Cocolobo, 2006). Tropical American Tree Farms offers to grow precious hardwoods, including *D. retusa* trees in **Costa Rica** for its customers. Due to the exceptionally high value of the timber they claim this will serve as a high-yielding long-term investment (TATF, no date).

One supplier claims that most of their cocobolo is salvaged from trees which fell during Hurricane Mitch, and that they have planted 50,000 trees on former cattle farms to ensure a future supply ([www.cocoboloking.com](http://www.cocoboloking.com)). Another supplier ([www.cocoboloinc.com](http://www.cocoboloinc.com)) claims to source their wood from hydroelectric dam sites and government-controlled reforestation schemes.

The Wounaan Indians now living at Gamboa in the Panama Canal Zone, who produce wooden carvings from Cocobolo harvested in the Darien are planting *D. retusa* seedlings locally on their reserve at Gamboa for future use (Gillett, H.J. Pers. Comm. 2006). It has been planted for lumber around Hacienda Barú, Costa Rica (Costa Rica Link, no date).

*Dalbergia retusa* was included in plantation trials of native precious wood species in Costa Rica, which started in 1992 (Fonseca & Chinchilla, 2002; Fonseca *et al.*, 2002), and is noted as a second choice native species choice for reforestation in the central Pacific zone of Costa Rica (Gustavo Torres & Ricardo Luján 2002). In managed plantations, trees may reach 13 cm diameter breast height and 8 m in height after 17 years (Marín and Flores, 2003 and references therein). They have been found to grow at a rate of 1.1 m/year (Knowles and Leopold, 1997).

Seeds of *D. retusa* are available from the CATIE forest seed bank (CATIE, 2006) and commercial suppliers (Section 6.2).

Guatemala reports the plantation of 58ha of *D. retusa* between 1998-2004 (INAB, 2004).

## 8.5 Habitat conservation

Less than 0.1% of dry tropical forest of Pacific Mesoamerica, the most important ecosystem for *D. retusa*, has conservation status (Section 4.1). However, the species does occur in some protected areas. The size of the protected areas is greater than the habitat available to the species, as they often cover a range of habitat types.

*D. retusa* occurs in several conservation areas of Costa Rica: Huetar Norte, Guanacaste (including Santa Rosa (49,515 ha) and Guanacaste (84,000 ha) National Parks), Pacífico Central (including Vida Silvestre Curú Refuge), and Tempisque (including Palo Verde National Park (13,058 ha), Lomas Barbudal Biological Reserve (2,279 ha)) (INBio, 1999). It is present in the Parque Nacional Marino Las Baulas (445 ha, mainly of mangroves and coastline; Guía Costa Rica, no date).

It is frequent in the Domitila Private Wildlife Reserve in Nicaragua (Lezama-Lopez and Grijalva, 1999), which is composed of 230 ha of dry forest, the last patch of dry tropical forest at the shores of Great Nicaragua Lake (Mejía, pers. comm. 2006).

Found in the tri-national protected area of Montecristo (1,973 ha), which spans Honduras, Guatemala and El Salvador (Komar *et al.*, 2005).

## 8.6 Safeguards

No information.

## 9. Information on similar species

A table listing other *Dalbergia* tree species of Central America is included in Annex 1.

The timber of *Dalbergia granadillo* (range States El Salvador and Mexico) is not distinguishable from that of *D. retusa* (Record and Hess, 1943; Richter, 2006). Although it has the common name "granadillo", it is often traded under the name "cocobolo" (Richter, 2006). Inclusion of this species in CITES Appendix II is therefore proposed for look-alike reasons.

*D. retusa* wood is denser and stronger than Brazilian rosewood *Dalbergia nigra* (SCMRE, 2002).

## 10. Consultations

The document was discussed at the 16th meeting of the CITES Plants Committee. The Netherlands sent a draft proposal to include *Dalbergia retusa* in Appendix II, to all Parties within the range of this species. Comments received by 15 December 2006 are incorporated in the document. This comprises a response from Costa Rica (ITCR/EIF, 2006). Mexico responded noting their forest authorities are compiling information on the species and that this will be sent once it is integrated (Benitez Diaz, 2006).

## 11. Additional remarks

This proposal was developed as a consequence of a series of activities, dating back to 1998, to identify timber trees in international trade of conservation concern, and to recommend appropriate long-term strategies to ensure their sustainable use (see Decision 13.54). Initial activities are outlined in document PC13 Doc. 14.2 (Rev. 1), and later reported in the Summary Record (item 11.2) of the 14th meeting of the Plants Committee. The first workshop for Mesoamerica was subsequently held in 2005 and the outcome included the suggestion that *Dalbergia retusa* should be considered for inclusion in CITES Appendix II (UNEP-WCMC, 2005). This suggestion was reported to the 15th meeting of the Plants Committee (Summary record item 22), which agreed to consider reviewing the listing of the species at its next meeting, based on a document to be provided by the Netherlands. The draft proposal was subsequently presented at the 16th meeting of the Plants Committee which encouraged the Netherlands to continue collecting information on these species and urged the range States to collaborate with the Netherlands in this matter. As a result the Netherlands wrote to all range States in 2006, including a copy of the proposal and requesting feedback.

## 12. References

- Americas Regional Workshop (Conservation and Sustainable Management of Trees, Costa Rica) 1998. *Dalbergia retusa*. In: IUCN 2004. 2004 IUCN Red List of Threatened Species. Accessed 17/01/2005. <http://www.redlist.org>
- Ampié, E. and Ravensbeck, L. 1994. Strategy of tree improvement and forest gene resources conservation in Nicaragua. Forest Genetic Resources Bulletin. No. 22.
- Anon, 2005. Nicaragua CDM reforestation project. Clean development mechanism project design document form for afforestation and reforestation project activities (CDM-AR-PDD). Available at: [http://www.ondl.gob.ni/mdl/Draft\\_CDM\\_AR\\_PDD\\_PW\\_Nicaragua.pdf](http://www.ondl.gob.ni/mdl/Draft_CDM_AR_PDD_PW_Nicaragua.pdf)
- Bawa, K.S. and Webb, C.J. 1984. Flower, fruit and seed abortion in tropical forest trees: implications for the evolution of paternal and maternal reproductive patterns. *American Journal of Botany*. 71(5): 736-751.
- Benitez Diaz, H. 2006. Email to Management Authorities of the Netherlands 6 Dec 2006, subject: "Possible listing of three timber proposals".
- CATIE, 2006. Centro Agronómico Tropical de Investigación y Enseñanza. [www.catie.ac.cr](http://www.catie.ac.cr)
- CITES, 1992. Proposal to include *Dalbergia nigra* in Appendix I to CITES.
- Cocobolo. 2006. Cocobolo supply company website. [http://www.cocobolo.net/new\\_page\\_2.htm](http://www.cocobolo.net/new_page_2.htm)
- Condit, R. and Pérez, R. 2002. *Tree Atlas of the Panama Canal Watershed*. Center for Tropical Forest Science, Panama. Accessed 07/02/2005. <http://ctfs.si.edu/webatlas/maintreeatlas.html>
- Costa Rica Link, no date. Accessed 21/02/2006. <http://www.1-costaricalink.com>
- Dalle, S.P. and Potvin, C. 2004. Conservation of useful plants: an evaluation of local priorities from two indigenous communities in eastern Panama. *Economic Botany* 58(1): 38-57.
- Echenique-Marique, R. and Plumptre, R.A. 1990. A guide to the use of Mexican and Belizean timbers. *Tropical Forestry Papers*, 20. Oxford Forestry Institute.
- FAO, 2005. *State of the World's forests*. 6<sup>th</sup> edition. Food and Agriculture Organisation of the United Nations, Rome.

- Flynn, J.H. 1994. *A guide to the useful woods of the world*. King Philip Publishing Co., Maine, USA 382pp.
- Fonseca G.W. and Chinchilla M.O., 2002. Native species in plantation in the south Pacific region of Costa Rica. Memoria del taller-seminario: especies forestales nativas, Heredia, Costa Rica, 4-5 April 2002, 97-100. Source: CAB Abstracts.
- Fonseca G.W., Chinchilla M.O., Guerrero R, 2002. Native species in plantation in the dry Pacific region of Costa Rica: the case of the precious woods. Memoria del taller-seminario: especies forestales nativas, Heredia, Costa Rica, 4-5 April 2002, 63-67. Source: CAB Abstracts.
- Frankie, G.W., Vinson, S.B., Thorp, R.W., Rizzardi, M.A., Tomkins, M. and Newstrom-Lloyed, L.E. 2002. Monitoring: an essential tool in bee ecology and conservation. *In*: Kevan, P and Imperatriz Fonseca, V.L. (Eds). Pollinating bees – the conservation link between agriculture and nature. Ministry of Environment. Brasília. pp. 187-198. <http://www.webbee.org.br>
- FSC, 2006. Forest Stewardship Council Database on Forest Management Certificate holders. Accessed 21/02/2006. <http://www.fsc-info.org/english/dbfme.asp>
- Guia Costa Rica, no date. Accessed 21/02/2006. <http://www.guiascostarica.com/area27.htm>
- Gustavo Torres C, Ricardo Luján F, 2002. Native forest species for reforestation in the Brunca and central Pacific regions of Costa Rica. Memoria del taller-seminario: especies forestales nativas, Heredia, Costa Rica, 4-5 April 2002, 101-104.
- Hobbithouse inc. 2006. Hobbhttp://www.hobbithouseinc.com/personal/woodpics/cocobolo.htm
- ILDIS, 2005. International Legume Database and Information Service. Accessed 25/01/2006. <http://www.ildis.org/LegumeWeb>
- INAB, 2004. Boletín de Estadística Forestal. Instituto Nacional de Bosques. <http://www.inab.gob.gt/espanol/inab/estadisticas/2004/BoletinEstadistico2004.pdf>
- INAB, 2006. Instituto Nacional de Bosques. Listado de las principales especies forestales de Guatemala. Accessed 27/01/2006. <http://www.inab.gob.gt/espanol/documentos/codigoe.pdf>
- INBio, 1999. Instituto Nacional de Biodiversidad UBIs: Unidades básicas de información. Accessed 13/01/2005. <http://darnis.inbio.ac.cr/ubis>
- INBio 2006 Instituto Nacional de Biodiversidad (InBio), Guatemala Website. <http://darnis.inbio.ac.cr/ubisen/FMPro?-DB=UBIPUB.fp3&-lay=WebAll&-error=norec.html&-Format=detail.html&-Op=eq&id=2150&-Find>
- ITTO, 2004. International Tropical Timber Organisation Annual Review 2004. <http://www.itto.or.jp>
- ITCR/EIF. 2006. Distribución – estado de conservación – habitat impacto del comercio y existencia de material de identificación de: *Dalbergia retusa* y *Cedrela odorata*. Instituto Tecnológico de Costa Rica Escuela de Ingeniería de Forestal. Unpublished 6pp. [Response to the Netherlands' request to the CITES Management Authority of Costa Rica for information regarding the proposed inclusion of *Dalbergia retusa* in Appendix II].
- Janzen, D.H. 1988. Tropical dry forests: the most endangered tropical ecosystem. *In*: Wilson, E. (Ed.) Biodiversity. National Academy Press, Washington, D.C. pp.130-137.
- Jenkins, M., Oldfield, S. and Aylett, T. 2002. International trade in African blackwood. Fauna and Flora International, Cambridge, UK.
- Jiménez Madrigal, Q. 1993. Árboles maderables en peligro de extinción en Costa Rica. San José, Costa Rica: Museo Nacional de Costa Rica. 121pp.
- Kline M. 1978. *Dalbergia retusa*. *In*: Flynn, J.H. 1994. A guide to useful woods of the world. King Philip Publishing Co: Portland, Maine, US. pp.133-134.
- Knowles, D.B. and Leopold, A.C. 1997. Native tree restoration on abandoned lands in Costa Rica. Poster presentation at the Society for Ecological Restoration Annual Meeting (November 12-15 1997, Ft. Lauderdale, FL).

- Komar, O., Borjas, G., Cruz, G.A., Eisermann, K., Herrera, N., Linares, J.L., Escobar, C.E. and Girón, L.E. 2005. Evaluación ecológica rápida en la propuesta área protegida trinacional Montecristo en territorio Guatemalteco y Hondureño. Informe de consultoría. San Salvador: SalvaNATURA programa de ciencias para la conservación.
- Lezama-Lopez, M. and Grijalva, L.A. 1999. Listado de las especies observadas (list of trees at Domitila). Universidad Centroamericana. <http://www.domitila.org/>
- Manuel Maass, J. 1995. Conversion of tropical dry forest to pasture and agriculture. *In*: Bullock, S.H., Mooney, H.A. and Medina, E. 1995. Seasonally Dry Tropical Forests. The University Press, Cambridge. pp 399-422.
- Marín, W.A. and Flores, E.M. 2003. *Dalbergia retusa* Hemsl. *In*: Vozzo, J.A. 2003. Tropical Tree seeds Manual. Part II Species descriptions. United States Department of Agriculture Forest Service. pp. 429-431.
- Mejía, S. pers. comm. 2006. Domitila Private Wildlife Reserve, Granada, Nicaragua.
- Melgarejo, C. 2005. Servicio Nacional de Desarrollo y Administración Forestal, Panama. [Presentation to Timber Tree workshop, Nicaragua February 2005] <http://www.unep-wcmc.org/forest/timber/workshops/reports/MA2005.htm>.
- Murphy, P.G. and Lugo, A.E. 1995. Dry forests of Central America and the Caribbean. *In*: Bullock, S.H., Mooney, H.A. and Medina, E. 1995. Seasonally Dry Tropical Forests. The University Press, Cambridge. pp 9-34.
- MOBOT. 2006. Missouri Botanical Garden. TROPICOS: Mesoamerican Checklist. Accessed 08/03/2006. <http://mobot.mobot.org/W3T/Search/meso.html>
- NAS (1979) *Tropical legumes: resources for the future*. National Academy of Sciences. Washington, D.C.
- Piotto, D., Viquez, E., Montagnini, F. and Kanninen, M. 2004. Pure and mixed forest plantations with native species of the dry tropics of Costa Rica: a comparison of growth and productivity. *Forest Ecology and Management*, 190: 359-372.
- Rasolomampianina, R., Bailly, X., Fetiariison, R., Rabevohitra, R., Béna, G., Ramarason, L., Rahehimandimby, M., Moulin, L., de Lajudie, P., Dreyfus, B. and Avarre, J-C. 2005. Nitrogen-fixing nodules from rose wood legume trees (*Dalbergia* spp.) endemic to Madagascar host seven different genera belonging to  $\alpha$ - and  $\beta$ -Proteobacteria. *Molecular Ecology* (14)13: 4135.
- Record, S.J. 1942. American timbers of the genera *Dalbergia* and *Machaerium*. 72: 1-11.
- Record, S.J. and Hess, R.W. 1943. *Timbers of the New World*. Yale University Press, New Haven; H. Milford, Oxford University Press, London. 640pp.
- Richter, H.G. 2006. Pers. Comm. (email) 27 Nov 2006 from Dr. H.G. Richter, Departamento de Madera, Celulosa y Papel, Universidad de Guadalajara, Jalisco, Mexico, concerning possible inclusion of *Cedrela odorata*, *Dalbergia retusa* and *Dalbergia stevensonii* in CITES Appendix II.
- Ricker, M. and Daly, D.C. 1997. Botánica económica en bosques tropicales. Editorial Diana, Mexico.
- Rudd, V.E. 1995. New combinations and a new variety in Mesoamerican *Dalbergia* (Fabaceae: Papilionoideae). *Novon* 5: 368-369.
- Schmidt, R.J. 2006. Botanical dermatology database. Cardiff University. Accessed 21/02/2006. <http://BoDD.cf.ac.uk/BotDermFolder/BotDermL/LEGU.html>
- Schmincke, K.H. 2000. Teak plantations in Costa Rica – precious woods' experience. *Unasylva* 201(51): 29-35.
- SCMRE, 2002. Smithsonian Center for Materials Research and Education. Microscopy: Technical Information Sheet *Dalbergia retusa*. [http://www.si.edu/scmre/educationoutreach/dalbergia\\_retusa.htm](http://www.si.edu/scmre/educationoutreach/dalbergia_retusa.htm)
- Secretaría de Desarrollo Social. 1994.
- Standley, P.C. 1928. Flora of the Panama Canal Zone. Contributions from the United States National Herbarium. Volume 27. United States Government Printing Office, Washington. 416pp.

- Stevens, W.D., Ulloa, C., Pool, A. and Montiel, M. 2001. Flora de Nicaragua. Monographs in Systematic Botany from the Missouri Botanical Garden.
- Szejner, M. 2005. Herbario FAUSAC, Guatemala [Presentation to Timber Tree workshop, Nicaragua February 2005] <http://www.unep-wcmc.org/forest/timber/workshops/reports/MA2005.htm>.
- TATF, no date. Tropical American Tree Farms. <http://www.tropicalhardwoods.com>
- Tilki, F. and Fisher, R.F. 1998. Tropical leguminous species for acid soils: studies on plant form and growth in Costa Rica. *Forest Ecology and Management*, 108: 175-192.
- Titmuss, F.H. and Patterson, D. 1988. *Commercial timbers of the world*. Fifth Edition. Gower Technical, Aldershot. 339pp.
- TROPICOS, 2006. Missouri Botanical Garden's VAST (VAScular Tropicos) nomenclatural database <http://mobot.mobot.org/W3T/Search/vast.html>
- UNEP-WCMC. 2005. Strategies for the sustainable use and management of timber tree species subject to international trade: Mesoamerica. Report of Mesoamerican Workshop, Managua, Nicaragua 2005.
- Varela Jiménez, C. and Rodríguez Coffre, G. 2005. Sistema Nacional de Areas de Conservación (SINAC), Costa Rica. [Presentation to Mesoamerican Timber Tree workshop, Nicaragua February 2005] <http://www.unep-wcmc.org/forest/timber/workshops/reports/MA2005.htm>
- Velásquez Runk, J., Mepaquito, P. and Peña, F. 2004. Artisanal non-timber forest products in Darién province, Panamá: the importance of context. *Conservation and Society*, 2(2): 217-234.
- Wishnie, M.H., Deago, J., Sautu, A and Mariscal, E. 2002. Viability of three native tree species for reforestation in riparian areas within the Panama Canal watershed, Republic of Panama. 2<sup>nd</sup> annual report, PRORENA working paper ECO-04-03-En.

## DALBERGIA TREE/SHRUB SPECIES OF MESOAMERICA

Species	Common names	Notes	Threat status	BZ	CR	SV	GT	HN	MX	NI	PA	Habit
<i>D. brownei</i> (Jacq.) Urb.	Coin vine; Brown's Indian rosewood (a confusing name - the species is confined to American continent).	Occurrence reported in the Caribbean, Meso-America, North America, South America and the United States [9] [13]. <i>D. brownii</i> and <i>D. brownei</i> (Jacq.) Schinz are synonyms of <i>D. brownei</i> [6]. <b>Possibly in international trade</b> [12].		x	x	x	x	x	x	x	x	Woody vine/shrub [13].
<i>D. calderonii</i> Standl.		Occurrence reported in Mesoamerica only [9]. Species with two varieties, var. <i>calderonii</i> and var. <i>molinae</i> . The var. <i>molinae</i> occur in Honduras and Nicaragua [10] [13]. <b>No evidence of international trade.</b>				x		x	x	x		Tree [13].
<i>D. calycina</i> Benth	Granadillo [9]; cahuirica (Mexico), calyxlike rosewood, palissandre à faux calice [15].	Occurrence reported in Mesoamerica only [9] [13]. <b>No evidence of international trade.</b>			x	x	x	x	x	x		Tree [13].
<i>D. chontalensis</i> Standl. & L.O. Williams		Occurrence reported in Mesoamerica only [9] [13].			x	x	x	x		x		Shrub [13].
<i>D. congestiflora</i> Pittier	Camatillo rosewood, campinchirán [17].	Occurrence reported in Mesomerica only [9] [13]. <b>In international trade</b> [11][12][1].	In danger of extinction [24]						x			Tree [13].
<i>D. cubilquitzensis</i> (Donn. Sm.) Pittier	Granadillo [9].	Occurrence reported in Mesoamerica only [9] [13]. <b>In international trade</b> [11].			x				x	x		Tree [13].
<i>D. cuscatlanicum</i> Standl.	Cuscatlán retuse rosewood, palissandre rétus de Cuscatlán [15].	Occurrence reported in Mesoamerica only [9]. Other author regard this as <i>D. retusa</i> var. <i>cuscatlanica</i> (Standley) Rudd [10].			x		x		x		x	Tree [9].
<i>D. ecastaphyllum</i> (L.) Taub.	Bejuco de peseta, bugi, clous , maraimaray, maray-maray, marmeleiro-da-praia, marmelo, palo de pollo [9]. For more common names refer to [15].	Widespread species that occur in Africa, Asia, Caribbean, North America, Mesoamerica, South America and India [9] [13]. <b>No evidence in international trade.</b>	Not threatened [9].	x	x		x	x	x	x	x	Woody vine/shrub [13].
<i>D. frutescens</i> (Vell.) Britton	Brazilian tulipwood, kingwood, tulip wood, bois de rose, bahia rozehout, violet wood, pinkwood, pau rosa [16].	Mainly S. America [14]. <b>In international trade</b> [1] [12].			x							Woody vine/shrub [13].

Species	Common names	Notes	Threat status	BZ	CR	SV	GT	HN	MX	NI	PA	Habit
<i>D. funera</i> Standl.	Funera rosewood, palissandre funera, ébano, funera (El Salvador) [15].	Occurrence reported in Mesoamerica only [9]. The wood is of wide importance in carpentry and construction [4]. Threatened by agriculture, logging, land conversion and invasive species [4].	Endangered GT [2] and SV [3], DD [4].			x	x					Tree [9].
<i>D. glabra</i> (Mill.) Standl.	Logwoodbrush rosewood, logwood brush (Belize), palissandre glabre, mayagua (Guatemala), cibix (Maya, Belize and Guatemala), ixcipix, muc (Maya, Guatemala), muk (Maya, Belize) [15].	Occurrence reported in Mesoamerica only [9] [13]. <b>No evidence of international trade.</b>		x	x	x	x	x	x	x		Woody vine/shrub [13].
<i>D. glomerata</i> Hemsl.	Glomerate rosewood; palissandre à glomérules [15].	Occurrence reported in Mesoamerica only [9][13].	VU A1c [4].				x	x	x			Tree [13].
<i>D. granadillo</i> Pittier	Granadillo [5].	Occurrence reported in Mesoamerica only [9] [13]. <b>In international trade</b> [18][19][11].	Threatened [5]. Species in danger of extinction [24]			x			x			Tree [13].
<i>D. intibucana</i> Standl. & L.O. Williams		Occurrence reported in Mesoamerica only [9] [13].	CR C2a [4].					x				Tree [13].
<i>D. melanocardium</i> Pittier	Blackheart rosewood, palissandre à cœur noir; chapulaltapa; ebano [15].	Occurrence reported in Mesoamerica only [9] [13].			x	x	x	x	x			Tree [13].
<i>D. monetaria</i> L.f.	Bejuco de Peseta, clous, membrillo, money bush, palo de brasilete [13].	Occurrence reported in the Caribbean, Mesoamerica and South America [9] [13].		x	x		x	x	x	x	x	Woody vine/shrub [13].
<i>D. palo-escrito</i> Rzed.	Palo escrito [20].	Occurrence reported in Mesoamerica only [9] [13]. <b>In international trade</b> [20].							x			Tree [13].
<i>D. retusa</i> Hemsl.	See <i>D. retusa</i> proposal.	See <i>D. retusa</i> proposal.	VU A1acd [4].	x	x	x	x	x	x	x	x	Tree [13].
<i>D. stevensonii</i> Standl.	See <i>D. stevensonii</i> proposal.	See <i>D. stevensonii</i> proposal.		x			x		x			Tree [13].
<i>D. tilarana</i> N. Zamora	Tilarán rosewood, palissandre de Tilarán [15].	Occurrence reported in Mesoamerica only [12] [13].			x					x	x	Tree [13].
<i>D. tucurensis</i> Donn. Sm.	Granadillo [21] [22] [23].	Occurrence reported in Mesoamerica only [9] [13]. Certified wood available in Nicaragua [7]. <b>In international trade</b> [21] [22] [23].		x	x	x	x	x	x			Tree [13].

## References

- [1] <http://www.cookwoods.com>
- [2] Rodas, J. & J. Aguilar 1980. Lista de algunas especies vegetales en via en extinción. INAFOR, Guatemala City, Guatemala. 3p. (unpublished).
- [3] Aguilar, J. Pers. Comm. 1981.
- [4] <http://iucnredlist.org/>. The 2004 IUCN Red List of Threatened Species. Downloaded on 21 March 2006
- [5] [http://www.semarnat.gob.mx/pfnm2/fichas/dalbergia\\_granadillo.htm](http://www.semarnat.gob.mx/pfnm2/fichas/dalbergia_granadillo.htm)
- [6] <http://www.ipni.org/index.html>. International Plant Names Index 2004. Downloaded on 15 March 2006
- [7] <http://www.morgansrock.com/articles/smartwood.htm>; <http://www.brandsystems.net/SmartWood/CustomerFactSheets/2941.asp>
- [8] <http://plants.usda.gov/java/profile?symbol=DABR2>
- [9] <http://www.ildis.org>. International Legume Database & Information Service. Downloaded on 15 March 2006
- [10] Rudd, V.E. 1995. New Combination and a New Variety in Mesoamerican Dalbergia (Fabaceae: Papilionoideae). NOVON 5: 368-369.
- [11] <http://www.gilmerwood.com/index.html>
- [12] <http://www.hobbitthouseinc.com>
- [13] <http://mobot.mobot.org/W3T/Search/vast.html>. Missouri Botanical Garden's VAST (VAScular Tropicos) nomenclatural database. Downloaded on 21 March 2006
- [14] <http://www.inbio.ac.cr/es/default.html>
- [15] <http://www.wdt.qc.ca/>. World Dictionary of Trees. Downloaded on 15 March 2006
- [16] <http://mmd.foxtail.com/Tech/Wood/>
- [17] [http://www.semarnat.gob.mx/pfnm2/fichas/dalbergia\\_congestiflora.htm](http://www.semarnat.gob.mx/pfnm2/fichas/dalbergia_congestiflora.htm)
- [18] <http://www.rarewoodsandveneers.com/pages/specimens/rarewoods/rarewood22.htm>
- [19] <http://www.cocobolo.net>
- [20] <http://www.lmii.com/CartTwo/cat32e.pdf>.
- [21] <http://ttrader.net/current>
- [22] <http://www.globalwood.org/trade/godetail.asp?id=26882>
- [23] <http://www.brandsystems.net/SmartWood/CustomerFactSheets/3215.asp>
- [24] Nom-059-ecol-1994