IDENTIFICATION, PROPERTIES AND USES OF SOME SOUTHEAST ASIAN WOODS

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Foreword

Southeast Asia is rich in tree species. It is reported that 4,000 species occur in Indonesia, 3,500 species in the Philippines and 3,000 species in Malaysia. Since the number of species of commercial timbers are increasing, better knowledge of the properties and uses of these timbers is indispensable to their rational utilization. The completion of ITTO project PD 41/88 (I) "The Identification, Properties and Uses of Tropical Timber Imported to China from Southeast Asia" will make contribution in providing these information.

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This study was undertaken by Liu Peng, Chen Fang and Yang Jiaju and whilst most attention was given by them to details in the preparation of this publication, some inaccuracies or errors may still be found for which the authors would greatly appreciate any reader's comments.

He Malizhang

· Director of Research Institute of Wood Industry Chinese Academy of Forestry

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 $T_{k}^{\mathrm{total}}(T_{k}^{\mathrm{total}}) = \mathcal{C}_{k,n}^{\mathrm{total}}$

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Explanatory Note

Trade Name The most common name used in the international trade. Sometimes, the same trade name may be used for different species.

Botanical name Scientific name presently adopted by botanists.

Local name Local or country name used in the international trade.

Habit of Tree

Small tree: Diameter 3-30cm, Height 2-5m.
Medium tree: Diameter 30-40cm, Height 5-15m.

Large tree: Diameter over 40cm, Height over 15m.

Texture The wood constituents, particularly the tangential diameters of vessels are considered.

Very fine: Mean tangential diameter of vessels < 100um
Fine: Mean tangential diameter of vessels 100-200um
Medium: Mean tangential diameter of vessels 200-300um
Coarse: Mean tangential diameter of vessels > 300um

Weight It is estimated based on air density. (M.C. 15%)

 Very light:
 < 0.35 g/cm³</td>

 Light:
 0.36-0.55 g/cm³

 Moderately heavy:
 0.56-0.75 g/cm³

 Heavy:
 0.76-0.95 g/cm³

 Very heavy:
 > 0.96 g/cm³

Shrinkage Tangential shrinkage (%) Green to M.C. 12%, Green to oven-dry

Very small	< 2.5	< 3.5
Small	2.6-4.0	3.6-5.0
Comparatively large	4.1-5.5	5.1-6.5
Large	5.6-7.0	6.6-8.0
Very large	> 7.1	> 8.1

Strength classes Based on compressive strength, timbers are divided into five strength classes:

Very weak < 29 MPa M.C. 15 % Weak 30-44 Medium 45-59 Strong 60-74 Very strong > 74

Air drying rates

Drying rate of 40 mm thick boards

Fast

Moderately fast

Moderately slow

Slow

Very slow

Drying rate of 40 mm thick boards

Less than 3 months

4-6

6-8

More than 8 months

Nature durability

Number of years
Non-durable 0-2
Moderately durable 2-5
Durable 5-10
Very durable More than 10 years

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Descriptions of species arranged by Families

					•	
Anacardiaceae	1	1.1	Hernandiaceae	67	Sonneratiaceae	177
Annonaceae	10		Icacinaceae	68	Sterculiaceae	180
Apocynaceae	12		Irvingiaceae	69	Theaceae	187
Aquifoliaceae	14		Juglandaceae	70	Tetrameristaceae	189
Barringtoniaceae	15		Lauraceae	71	Thymelaeaceae	190
Bombacaceae	16		Leguminosae	78	· Tiliaceae	191
Boraginaceae	19	:	Loganiaceae	106	Ulmaceae	194
Burseraceae	20		Lythraceae	107	Verbenaceae	196
Casuarinaceae	21		Magnoliaceae	109	Xanthophyllaceae	201
Celastraceae,	22		Melastomataceae	114		
Combretaceae	23		Meliaceae	116		
Compositae	28		Moraceae	129		
Cornaceae	29		Myrtaceae	135		
Crypteroniaceae	30		Nyssaceae	141		
Ctenolophonaceae	31		Olacaceae	142		
Datiscaceae	32	•	Proteaceae	145		
Dilleniaceae	34		Rhamnaceae	146		
Dipterocarpaceae	35		Rhizophoraceae	147		
Ebenaceae	54	1	Rosaceae	152		
Elaeocarpaceae	55		Rubiaceae	155		
Euphorbiaceae	56	•	Rutaceae	161		
Fagaceae	60		Samydaceae	163		
Guttiferae	62		Sapindaceae	165		
Hamamelidaceae	66		Sapotaceae	169	•	

TRADE NAME: Terentang BOTANICAL NAME: Campnosperma auriculata Hook. f. (Anacardiaceae)

LOCAL NAME: Terentang daun besar (M.): Nang pron (Th.): karamati, Talantang, Talantang putih (In.)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: white to grey, yellow, brown, red, - Odour: indistinct, - Grain: interlocked. - Texture: fine. - Weight: light. - Shrankage: small.

STRENGTH CLASSES: very weak.

SEASONING - Air drying rates: moderately fast, - Checking: no risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no, WORKING QUALITIES: easy,

USES: Veneer, Plywood, Wood based panel,

Food containers, Household appliance, Matches,

GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Indonesia,

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, scalariform, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: 20-40/sq.mm, Vessel element mean length: >800um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Paratracheal p.: scanty.

RAYS - Width: 1-3 cells. - Numbers: 4-12/mm. - Ray tissues: heterogeneous type II. - Radial intercellular canals present,

Locality of growth	•	•			Bending strength	•	Maximum crushingstrength MPa
Malaysia	5	16.6	0.30	0.370	42 51	7.0 6.5	22.4 26.3
Stress at proportionalit		Hardı Side grain	ness N. end grain	Shear paral R	el to grain MPa T		e to splittiing N/cm ane T-plane
2.21	2.37	1470 1541		7.5	9.0	38	39

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BOTANICAL NAME: Dracontomelon dao Merr. et Rolf (Anacardiaceae)
TRADE NAME: Dao
LOCAL NAME: Sengkuang, Mati anak(M.); kaili laki, Dahu ketiil daun (In.); Lamino (Ph.); New Guinea Walnut (N. Z., Aust.); Dorea, Loup (P. N.)
HABIT OF TREE: large tree,
PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: yellow, brown, with streaks, - Odour: indistinct,
                     - Grain: straight to fairly interlocked. - Texture: medium. - Weight: light. moderately heavy, - Shrankage: small, comparatively large,
STRENGTH CLASSES: medium, weak,
SEASONING - Air drying rates:
                                - Checking: - Deformation:
NATURE DUARBILITY: non-durable.
                                  RESISTANCE TO TERMITES: no.
                                                                 WORKING QUALITIES: easy.
USES: Interior finish, Furniture, Veneer, Plywood,
      Packing boxes,
GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, Papua New Guinea, China,
GROWTH RINGS: indistinct or absent,
VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,
               - Perforation plates: simple. - Intervessel pits: alternate.
               - Vessel-ray pitting: large, rounded, - Mean T.D.: 100-200um,
               - Vessel No.: <5/sq.mm. - Vessel element mean length: 350-800um. - Tyloses: present.
FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick,
AXIAL PARENCHYMA - Paratracheal p.: vasicentric, aliform, confluent,
RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II,
MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary,
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Locality of growth	•	•		•	•	us of Maximum crushingstrength ity GPa MPa
Philippines	2	72 0.5	3 0.659	101 92	2.6 12.5	11.6 49.6 45.8
Stress at l proportionality	•	Hardness N. Side grain ∣ end g	•	aralel to grain 1	MPa	Resistance to splittiing. N/cm R-Plane T-plane
8.62 7	7.46	5030 5580	1	10.5 10.9	·	

TRADE NAME: Rengas BOTANICAL NAME: Gluta renghas L. (Anacardiaceae)

LOCAL NAME: Rengas tembaga, Rengas hutan, rangai, Inghas (In.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: red. - Odour: indistinct.

- Grain: interlocked. - Texture: medium. - Weight: moderately heavy, heavy. - Shrankage: very small,

STRENGTH CLASSES: medium,

SEASONING - Air drying rates: moderately slow. - Checking: no risk of checking. - Deformation: no risk of deformation.

NATURE DUARBILITY: moderately durable, RESISTANCE TO TERMITES: no, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately difficult,

USES: Interior finish, Furniture, Veneer, Plywood,

Household appliance, Tool handle, Novelties,

GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia,

GROWTH RINGS: distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: >200,
- Vessel No.: <5/sq.mm. Vessel element mean length: 350-800um. Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: terminal. - Paratracheal p.: scanty. vasicentric. - Banded: 1-3 cells. >3 cells.

RAYS - Width: exclusively uniseriate, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate, - Radial intercellular canals present,

MINERAL INCLUSIONS - Silica: present in ray cells,

	rees Moisture Densi ed content % Basic density				
Indonesia	13.7	0.652	70.7 69.8	10.98 10.45	43.2 44.5
	Hardness N. Side grain end grain			:	ce to splittiing N/cm lane T-plane
	<u> </u>	3.2 4.	3.5 4.8	3.8	4.8

TRADE NAME: Mugis BOTANICAL NAME: Koordersjodendron pinnatum Merr. (Anacardiaceae)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, indistinct, - Heartwood Color: brown, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: fine, - Weight: moderately heavy, heavy, - Shrankage: small,

STRENGTH CLASSES: strong,

SEASONING - Air drying rates: slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation.

Section 1

NATURE DUARBILITY: moderately durable, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: easy,

USES: House building, Interior finish, Furniture,

LOCAL NAME: Amugis (Ph.): Bugis (In.): Ranggu (Sab. Sar.)

Turnery wood,

GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, Papua New Guinea,

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded. Mean T.D.: 100-200um.
- Vessel No.: <5/sq.mm, Vessel element mean length: 350-800um, Tyloses: present.

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Paratracheal p.: scanty, vasicentric,

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, - Radial intercellular canals present, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: chambered.

Locality of grow							/ g/cm3 Air-dry de							crushingstrength MPa
Philippines] 1		gr	een	. 0.69	9	0.844	. 1	65.9	126	12.6	16.8	36.4	69.4
Stress a proportional			Side				Shear	•	-					ittiing N/cm T-plane
8.82	8.9		5710	8232	4770	9356	1	10.0	15.5		1			

TRADE NAME: Jhintang BOTANICAL NAME: Lannea Coromandelica (Houtl.) Merr. (Anacardiaceae) LOCAL NAME: Coromandel lannea (China); Wodier (Ind.); Nabe (Bur.) HABIT OF TREE: medium tree, large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: brown. - Odour: indistinct. - Grain: straight. - Texture: medium. - Weight: light. - Shrankage: small: STRENGTH CLASSES: weak. SEASONING - Air drying rates: - Checking: no risk of checking. - Deformation: no risk of deformation. NATURE DUARBILITY: durable. WORKING QUALITIES: easy. USES: Interior finish, Textile timber, Furniture. Agricultural implement wood, Packing boxes, Turnery wood, Carvinge, Pulpwood, GEOGRAPHIC DISTRIBUTION: Burma, Indonesia, China, India, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse. - Perforation plates: simple. .- Intervessel pits: alternate. - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: scanty, RAYS - interconnected (fused) rays, - Width: commonly 4-10 seriate, - Numbers: 4-12/mm,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

- Ray tissues: heterogeneous type II,

Locality of gr								Maximum crushingstrength
•	tes	ted cor	ntent % Bas	sic density	Air-dry density	MPa .	elasticity GPa	MPa Dane
China		l		0.43	0.49	64.4	3.04	22.6
proportio						lel to grain MPa	•	nce to splittiing N/cm Plane T-plane

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TRADE NAME: Machang
                         BOTANICAL NAME: Mangifera indica L. (Anacardiaceae)
LOCAL NAME: Managa(Ph. Th. M.): Thayet(Bur.): Membatiang(In.): Manago(Ind. Pak.): Malapaho. Pahutan(Ph.)
HABIT OF TREE: large tree.
PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: yellow, with streaks. - Odour: indistinct.
                     - Grain: straight to fairly interlocked, - Texture: medium, - Weight: moderately heavy, - Shrankage: small,
STRENGTH CLASSES: weak.
SEASONING - Air drying rates: moderately fast. - Checking: slight risk of checking. - Deformation: slight risk of deformation.
NATURE DUARBILITY: non-durable.
                                  RESISTANCE TO TERMITES: no. : AMENABILITY TO PRESERVATIVE TREATMENT: medium,
                                                                                                                   WORKING QUALITIES: easy.
USES: Interior finish, Furniture, Veneer, Plywood,
      Wood mould, Turnery wood, Novelties,
GEOGRAPHIC DISTRIBUTION: Burma, Thailand, Malaysia, Indonesia, Indo-china, Parkistan, India, Sri Lanka,
GROWTH RINGS: moderately distinct,
VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse.
               - Perforation plates: simple. - Intervessel pits: alternate.
               - Vessel-ray pitting: large, rounded, - Mean T.D.: >200,
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- Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Septate fibres: present, - Mean length: 900-1600um, - Wall thickness: thin to thick,

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, >12/mm, - Ray tissues: heterogeneous type III,
MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, terminal, - Paratracheal p.: vasicentric, aliform, - Banded: 1-3 cells, >3 cells,

Locality of growth		•			Bending strength MPa	•	Maximum crushingstrength MPa
Malaysia	1	17.4	0.59	0.705	57 . 65	7.5 7.6	32.1 39.1
				Shear paral			ce to splittiing N/cm lane T-plane
	:	5650 6057		12.	2 14.9	[54	57

TRADE NAME: Thitsi BOTANICAL NAME: Melanorrhoea usitata Wall. (Anacardiaceae)
LOCAL NAME: Burma Varnish tree(Bur.): Rak(Th.): Rengas(M. In.)

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: red, purple, - Odour: indistinct,
- Grain: straight to fairly interlocked, - Texture: medium, - Weight: moderately heavy, - Shrankage:
STRENGTH CLASSES: medium.

SEASONING - Air drying rates: - Checking: - Deformation:

NATURE DUARBILITY: WORKING QUALITIES: moderately easy,

USES: Interior finish, Ship and boat manufacturing, Furniture, Veneer, Plywood,

Turnery wood, Tool handle,

GEOGRAPHIC DISTRIBUTION: Burma, Thailand,

GROWTH RINGS: moderately distinct,

VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse.

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: >200,
- Vessel No.: <5/sq.mm, Vessel element mean length: 350-800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: scanty, vasicentric, - Banded: >3 cells,

RAYS - Width: exclusively uniseriate, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate, - Radial intercellular canals present,

MINERAL INCLUSIONS - Silica: present in ray cells,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

						Maximum crushingstrength MPa
1						1
Stress at limit proportionality	•		•		•	nce to splittiing N/cm Plane T-plane
	l		 [1	

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TRADE NAME: Pelaju BOTANICAL NAME: Pentaspadon velutinus Hook. f. (Anacardiaceae)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: yellow, - Odour: indistinct,

- Grain: straight to fairly interlocked. - Texture: medium. - Weight: moderately heavy. - Shrankage: small,

STRENGTH CLASSES: medium,

SEASONING - Air drying rates: moderately slow, - Checking: - Deformation: slight risk of deformation,

NATURE DUARBILITY: moderately durable, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: easy,

USES: Interior finish, Plywood,

GEOGRAPHIC DISTRIBUTION: Malaysia, GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: 350-800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Paratracheal p:: scanty,

RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm.

- Ray tissues: heterogeneous type II, - Radial intercellular canals present,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary,

Locality of growth		•		ty g/cm3 Air-dry density	•	•	Maximum crushingstrength Pa MPa
Malaysia	4	47	0.46	0.560	53 80	8.6 10	.5 31.8 43.5
	limit y MPa	Hardne: Side grain		Shear paral	el to grain MPa	•	tance to splittiing N/cm R-Plane T-plane
3.10	4.1	4000		[7.9	10.4] 4	9 46

TRADE NAME: Merpauh BOTANICAL NAME: Swintonia floribunda Griff. (Anacardiaceae)
LOCAL NAME: Merpauh pering(M.); Civit(Bur.); Moum(Cam. Viet.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown, red. - Odour: indistinct.

- Grain: interlocked, - Texture: medium, - Weight: moderately heavy, heavy, - Shrankage: small,

STRENGTH CLASSES: medium.

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable, AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: moderately easy.

USES: Interior finish, Plywood,

Matches,

GEOGRAPHIC DISTRIBUTION: Burma, Thailand, Malaysia, Indonesia, Indo-china, Parkistan, India, Sri Lanka,

GROWTH RINGS: moderately distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm. Vessel element mean length: 350-800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse-in-aggregates, terminal, - Paratracheal p.: vasicentric, aliform, - Banded: >3 cells,

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary, chambered, - Silica: present in ray cells,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth		Moisture content % Basic			•	•	•	•	ength
Malaysia [15		0.874	101	105.2	16.2 15.7	50.1 54.5	
	•	Hardness N Side grain en		Shear paral R	el to grain			e to splittiing N/ ane T-plane	/cm
6.9 7.	7			10.	0 15.5		1		

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TRADE NAME: Bolon BOTANICAL NAME: Alphonsea arborea Merr. (Annonaceae)
LOCAL NAME: Memoisang(M.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: yellow. - Odour: indistinct.

- Grain: straight, - Texture: fine, - Weight: heavy, - Shrankage: comparatively large, very large.

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STRENGTH CLASSES: strong,

SEASONING - Air drying rates: - Checking: - Deformation:

NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no, WORKING QUALITIES: easy,

USES: Ship and boat manufacturing, Sporting goods,

Agricultural implement wood. Tool handle.

GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, China,

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Banded: 1-3 cells,

RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III,

Locality of growth	•	•		y g/cm³ Air-dry density	Bending strength MPa	Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines	2	12	0.71	0.864	138 127,	16.4 15.2	61.6 56.9
Stress at l proportionality	•		ness N. end grain	Shear paralo	el to grain -MPa T	•	ce to splittiing N/cm lane T-plane
11.8 1	0.2	9370 8527 .	9540 8681	1 11.	2 12.3	1	

TRADE NAME: Cananga BOTANICAL NAME: Cananga odorata Hook, f. et Thoms (Annonaceae)

LOCAL NAME: Iliang-Iliang, Alangilan, Tangit, tangig (Ph.); Fereng (Th.); Kenanga (In. Sab. Sar. Br.); Langolian (In.)

HABIT OF TREE: medium tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: brown, - Odour: distinct,

- Grain: straight. - Texture: coarse. - Weight: light. - Shrankage: comparatively large.

STRENGTH CLASSES: very weak.

SEASONING - Air drying rates: - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no, WORKING QUALITIES: easy,

USES:

Packing boxes, Household appliance, Turnery wood, Buoys,

GEOGRAPHIC DISTRIBUTION: Burma, Malaysia, Philippines, Indonesia, China, India,

GROWIN RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse;

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: >200,
- Vessel No.: <5/sq.mm. 5-20/sq.mm. Vessel element mean length: 350-800um.

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Banded: 1-3 cells.

RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type III,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth				y g/cm3 Air-dry density		Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines	5	12	0.30	0.364	45.6 45.6	7.36 6.33	23.3 21.5
Stress at proportionality	•	Hard Side grain		Shear paral R	el to grain MPa T		ce to splittiing N/cm lane T-plane
2.41	2.08	1470 1338	2360 2148	4.9	4 5.11		

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TRADE NAME: Pulai BOTANICAL NAME: Alstonia scholaris R. Br. (Apocynaceae)

LOCAL NAME: Dita (Ph.); Shaitan (Bur.); Popel khe (Cam.); Pulai biasa (In.); White cheeswood, Millky pine (Aust.); Mocua (Viet); Shaitan wood, chatian(Ind.)

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HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: yellow, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: medium, - Weight: light, - Shrankage: comparatively (arge,

STRENGTH CLASSES: weak,

SEASONING - Air drying rates: fast, - Checking: slight risk of checking, - Deformation: slight risk of deformation, NATURE DUARBILITY: non-durable, AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: moderately easy, USES: Interior finish. Plywood, Culture,

Packing boxes, Food containers, Wood mould, Household appliance, Matches, Pencils, Battery separators, .

GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, Burma, Thailand, Malaysia, Philippines, Indonesia, Indo-china, China, Parkistan, India, Sri Lanka, GROWTH RINGS: moderately distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: >800um, Tyloses: present, FIBRES AND FIBRE TRACHEIDS Pits: distinct bordered, Mean length: 900-1600um, Wall thickness: thin to thick, AXIAL PARENCHYMA Banded: 1-3 cells,
- RAYS interconnected (fused) rays, Width: 1-3 cells, Numbers: 4-12/mm,
- Ray tissues: heterogeneous type II, heterogeneous type III, Latex or tanniniferous tubes present,
 MINERAL INCLUSIONS Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, crystalliferous cells: ordinary, chambered,

Locality of growth	•	•		ty g/cm3 Air-dry density	• .	Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines	2	green	0.34	0.409	35.7 55	5.70 7.3	21.4 33.2
Stress at l proportionality				Shear paral R	el to grain MPa	<u>.</u>	nce to splittiing N/cm Plane T-plane
2.74	.7	1900	2160	3.5	7 7.7	.1	

TRADE NAME: Jelutong BOTANICAL NAME: Dyera costulata Hook. f. (Apocynaceae)

LOCAL NAME: Jelutong bukit (Sab.); Tinpeddaeng(Th.); Njalutung(In.)

· HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: white to grey, yellow, - Odour: indistinct,

- Grain: straight. - Texture: medium, - Weight: light, - Shrankage: very small,

STRENGTH CLASSES: weak,

SEASONING - Air drying rates: fast, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no, AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: moderately easy,

USES: Plywood, Culture.

Wood mould, Carvinge, Pencils, Battery separators,

GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Philippines, Indonesia, Indo-china, Papua New Guinea,

GROWTH RINGS: moderately distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal, and/or radial pattern,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: >800um.

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Banded: 1-3 cells,

RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm,

- Ray tissues: heterogeneous type II. - Latex or tanniniferous tubes present.

Locality of growth					Bending strength MPa		Maximum crushingstrength MPa
Malaysia	3	15.8	0.36	0.435	50 59	8.1 7.4	27.0 30.5
Stress at l proportionality	•				el to grain MPa		ce to splittiing N/cm lane T-plane
2.65 2	.75	1740 1782		5.8	6.7	36	41

TRADE NAME: Mensira BOTANICAL NAME: Ilex pleiobrachiata Loes (Aguifoliaceae) LOCAL NAME: Mensira gunung (In.) HABIT OF TREE: medium tree, PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: yellow, - Odour: indistinct. - Grain: straight - Texture: fine - Weight: heavy - Shrankage: large STRENGTH CLASSES: medium. SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: non-durable. WORKING QUALITIES: easy. USES: House building, Interior finish, Household appliance, Turnery wood, Carvinge, Tool handle, Matches, Pencils, Disposable chopsticks etc., GEOGRAPHIC DISTRIBUTION: Indonesia. GROWTH RINGS: moderately distinct. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, - Perforation plates: scalariform, - Intervessel pits: opposite, - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: 5-20/sg.mm. - Vessel element mean length: >800um. FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates,

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TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, - Ray tissues: heterogeneous type II, - Sheath cells present,

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Locality of growth No.of trees	s Moisture Densi content % Basic density				
	·		1	1	1.
Stress at limit proportionality MPa	Hardness N. Side grain ∣ end grain	• •		•	ce to splittiing N/cm lane T-plane
		.1		1	

TRADE NAME: Putat BOTANICAL NAME: Planchonia Valida Blume (Barringtoniaceae)
LOCAL NAME: Putat paya (In. Sab.): Selangan kan kong (sab.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, -- Heartwood Color: red. - Odour: indistinct.

- Grain: interlocked, - Texture: fine, - Weight: heavy, - Shrankage: small,

STRENGTH CLASSES: strong.

SEASONING - Air drying rates: moderately slow, - Checking: no risk of checking, - Deformation: no risk of deformation,

NATURE DUARBILITY: durable, WORKING QUALITIES: moderately easy,

USES: House building, Interior finish, Ship and boat manufacturing, Vehicle, Furniture,

Agricultural implement wood,

GEOGRAPHIC DISTRIBUTION: Burma, Malaysia, Indonesia,

GROWTH RINGS: moderately distinct, indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um.
- Vessel No.: 5-20/sq.mm. Vessel element mean length: 350-800um. Tyloses: present.

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: present, - Mean length: >1600um, -- Wall thickness: very thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Banded: 1-3 cells,

- RAYS interconnected (fused) rays. Width: 1-3 cells, commonly 4-10 seriate. Numbers: >12/mm.
- Ray tissues: heterogeneous type II, heterogeneous type III,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary,

Locality of growth				y g/cm3 Air-dry density				Maximum crushingstrength MPa
Indonesia		64.9	0.68	0.831	78.6	123.6	12.16 16.48	39.5 68.3
Stress at li proportionality	•	Hardr Side grain		Shear para R	lel to grain	MPa T	!	ce to splittiing N/cm lane T-plane
				6.1 6.	8 6.8	7.7		

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TRADE NAME: Didu BOTANICAL NAME: Bombax insigne Wall. (Bombacaceae)

LOCAL NAME:

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: yellow, - Odour: indistinct,

- Grain: straight, - Texture: coarse, - Weight: light, - Shrankage: small,

STRENGTH CLASSES: weak.

SEASONING - Air drying rates: fast, - Checking: no risk of checking, - Deformation: no risk of deformation, NATURE DUARBILITY: non-durable, AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: easy, USES: Furniture, Veneer, Plywood, Musical instruments,

Food containers, Wood mould, Household appliance, Matches, Battery separators, Buoys, GEOGRAPHIC DISTRIBUTION: Vietnam, Laos, Burma, China, India, GROWTH RINGS: distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: >200,
- Vessel No.: <5/sq.mm. Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Paratracheal p.: scanty, vasicentric, - Banded: 1-3 cells,

RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type III,

MISCELLANEOUS: Rays storied, Axial parenchyma storied, Fibres storied,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

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Locality of growth	No.of trees	Moisture D content % Basic dens	ensity g/cm³ ity Air-dry density	Bending'strength MPa	Modulus of elasticity GPa	Maximum crushingstrength
India	1	8.9	0.395	52 44.7	7.000 6.17	30 22.7
		Hardness N. Side grain ˈ∣ end gra			•	nce to splittiing N/cm Plane T-plane
			1			

TRADE NAME: Durian BOTANICAL NAME: Durio zibethinus Murr. (Bombacaceae)

LOCAL NAME: Durian daun, Durian kampong (M.) Durain puteh (Sab.); Durian benar, Laung, Loeria (In.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: brown, red, - Odour: indistinct,
- Grain: interlocked. - Texture: coarse. - Weight: light. moderately heavy. - Shrankage: large.

STRENGTH CLASSES: medium, weak,

SEASONING - Air drying rates: moderately fast, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: moderately, AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: moderately easy

USES: House building, Furniture, Plywoody

Nousehold appliance,

GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia,

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse porous, - Arrangement: in diffuse,

- Perforation plates: simple. - Intervessel pits: alternate.

- Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: >200,

- Vessel No.: <5/sq.mm, - Vessel element mean length: >800um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Paratracheal p.: vasicentric, - Banded: 1-3 cells,

RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, - Tile cells: Durio type, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells. - crystalliferous cells: chambered.

Locality of growth No.of tre		y g/cm3 Bending str Air-dry density MPa	ength Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines 1	green 0.45	0.546 48.1	77 8.16 10.3	22.6 42.4
Stress at limit proportionality MPa	Hardness N. Side grain end grain	Shear paralel to grain R		nce to splittiing N/cm Plane T-plane
3.69 3.9	2350 3210 2970 3954	5.88 10.2	1	

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- BOTANICAL NAME: Ochroma ovramidale Urban (Bombacaceae) LOCAL NAME: HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: white to grey. - Odour: indistinct. - Grain: straight. - Texture: coarse. - Weight: very light. - Shrankage: large. STRENGTH CLASSES: very weak. SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: non-durable. RESISTANCE TO TERMITES: no. WORKING QUALITIES: easy. USES: Plywood. Household appliance, Battery separators, Buoys, GEOGRAPHIC DISTRIBUTION: Philippines, Indonesia, GROWTH RINGS: indistinct or absent, VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple, - Intervessel pits: alternate. - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: >200, - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, FIBRES AND FIBRE TRACHEIDS - Pits: - Mean length: >1600um, - Wall thickness: very thin, AXIAL PARENCHYMA - Paratracheal p.: vasicentric, - Banded: 1-3 cells, RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, - Sheath cells present.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

						Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines	1	12	0.31	0.364	50.5 50.5	6.41 5.51	23.4 21.6
proportionality	MPa	Hardnés Side grain	end grain	Shear parale	l to grain. MPa	Resistan R-P	ce to splittiing N/cm lane T-plane
4.93 / 4.	•		2410 2193				

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TRADE NAME: Balu BOTANICAL NAME: Cordia subcordaté Lam. (Boraginaceae) LOCAL NAME: Salimuli (In.) HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: yellow, brown, with streaks. - Odour: indistinct, - Grain: straight to fairly interlocked, - Texture: fine, - Weight: light, moderately heavy, - Shrankage: STRENGTH CLASSES: medium. SEASONING - Air drying rates: - Checking: - Deformation: WORKING QUALITIES: easy. NATURE DUARBILITY: non-durable. USES: Furniture, Plywood, Musical instruments. Turnery wood, Gunstocks, GEOGRAPHIC DISTRIBUTION: Philippines, Indonesia. GROWTH RINGS: moderately distinct. VESSELS/PORES - Porosity: wood semi-ring-porous, - Arrangement: in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 100-200um,

- Vessel No.: 5-20/sq.mm, - Vessel element mean length: <350um,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, terminal, - Paratracheal p.: vasicentric, aliform, confluent,

RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, - Sheath cells present,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells. - crystalliferous cells: ordinary,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

ocality of growth	No.of trees	Moisture	Densit	y g/cm3	Bending strength	Modulus of	Maximum crushingstrength
••		•	Basic density	Air-dry density	MPa	elasticity GPa	MPa
		1 1.					
	MPa	•		Shear paral	el to grain MPa		ce to splittiing N/cm lane T-plane
	4			Ι ,			•

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TRADE NAME: Piling-liftan

BOTANICAL NAME: Canarium luzonicum A. Gray (Burseraceae)

LOCAL NAME:

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, indistinct, - Heartwood Color: brown, red, - Odour: distinct,

- Grain: straight to fairly interlocked, - Texture: medium, - Weight: light, moderately heavy, - Shrankage: small, comparatively large,

STRENGTH CLASSES: medium, weak.

SEASONING - Air drying rates: moderately slow, - Checking: no risk of checking, - Deformation: no risk of deformation,

NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no. AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: easy,

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USES: House building, Interior finish, Furniture, Veneer, Plywood, Wood based panel,

Agricultural implement wood, Packing boxes,

GEOGRAPHIC DISTRIBUTION: Philippines,

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,

- Perforation plates: simple. Intervessel pits: alternate.
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYM1 - Paratracheal p.: scanty, vasicentric,

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, - Radial intercellular canals present, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells. - crystalliferous cells: ordinary.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth	No.of trees	Moisture		y g/cm³ Air-dry density	•			Maximum crushingstrength
Philippines	4	12	0.48	0.568	84.8 77	7.7	7.95 7.37	40.9 37.8
	•			Shear paral			•	nce to splittiing N/cm Plane T-plane
9.32	8.06	3600 3276	5670 5160	13.	3 13.8		1	

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TRADE NAME: Agoho BOTANICAL NAME: Casuarina equisetifolia L. (Casuarinaceae) LOCAL NAME: Ru (M.): Aru. Semipilau (Sab.): Tiemara Laut (In.): She oak (Aust. N. G) and the second second second HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, indistinct. - Heartwood Color: brown, red. - Odour: indistinct. - Grain: straight. oblique. - Texture: fine. - Weight: heavy, very heavy, - Shrankage: large,

STRENGTH CLASSES: very strong, strong,

SEASONING - Air drying rates: - Checking: slight risk of checking, - Deformation: slight risk of deformation, NATURE DUARBILITY: non-durable, AMENABILITY TO PRESERVATIVE TREATMENT: Low. WORKING QUALITIES: moderately difficult USES: House building, Durable timber. Ship and boat manufacturing, Vehicle.

Fuel, Pulpwood

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GEOGRAPHIC DISTRIBUTION: Vietnam. Cambodia, Malaysia, Philippines, Indonesia, China, Parkistan, India, GROWTH RINGS: moderately distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern,

- Vessel grouping: exclusively solitary. Perforation plates: simple, scalariform, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits. Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered. - Mean length: 900-1600um. - Wall thickness: very thick. TRACHEIDS: vasicentric. AXIAL PARENCHYMA - Aportracheal p.: diffuse. diffuse-in-aggregates. - Banded: 1-3 cells. RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, >12/mm, - Ray tissues: homogeneous uniseriate and multiseriate, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary, chambered,

Locality of growth No. of tree tested					
Philippines 7	12 0.84	1.103	175 160	21.3 19.8	82.8 76.5
Stress.at limit: proportionality MPa	Side grain end grain	[R	Ţ		
जातारी 21:3 के महिल्ला 48:4 ()	15600 14196 14700 1337				

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TRADE NAME: Mata ulat BOTANICAL NAME: Kokoona reflexa (Laws.) Ding Hou (Celastraceae)

HABIT OF TREE: small tree, medium tree.

PHYSICAL PROPERTIES: - Heartwood and Sapwood: indistinct. - Heartwood Color: brown. - Odour: indistinct.

- Grain: straight to fairly interlocked. - Texture: fine, - Weight: heavy, - Shrankage: very small,

STRENGTH CLASSES: medium.

LOCAL NAME:

SEASONING - Air drying rates: moderately fast, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: moderately durable, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: easy,

USES: House building; Interior finish, Durable timber, Furniture,

GEOGRAPHIC DISTRIBUTION: Malaysia,

GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Vessel grouping: exclusively solitary, - Perforation plates: simple, - Intervessel pits: extremely rare or absent,

- Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 100-200um,

7- Vessel No.: 20-40/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits,

FIBRES AND FIBRE TRACKEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Banded: >3 cells,

RAYS - Width: exclusively uniseriate, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary,

· · · · · · · · · · · · · · · · · · ·	content % Basic density	y g/cm³ Bending strengt Air-dry density MPa	h Modulus of Maximum crushingstrens elasticity GPa MPa	gth
Malaysia () in its in i	15	1.121 102 106.	3 16.3 15.8 53.1 57.7	
Stress at limit'	Hardness N. Side grain end grain	Shear paralel to grain MPa	Resistance to splittiing N/cm	
6.83 1 1 74.58 100			1	

TRADE NAME: Yon BOTANICAL NAME: Anogeissus acuminata Wall. (Combretaceae)

LOCAL NAME: Takien-nu (Th.); Ram (Viet.)

HABIT OF TREE: medium tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, indistinct, - Heartwood Color: yellow, purple, - Odour: indistinct,

- Grain: straight, oblique, - Texture: fine, - Weight: heavy, - Shrankage: very large,

STRENGTH CLASSES: strong,

SEASONING - Air drying rates: - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable, WORKING QUALITIES: moderately difficult,

USES: Durable timber, Textile timber,

Turnery wood, Tool handle,

PRODUCE NO STATE

GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Philippines, Indonesia, Indo-china, Papua New Guinea, China, GROWTH RINGS: distinct, moderately distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,

- Vessel grouping: radial multiple, Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm. Vessel element mean length: 350-800um.

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Septate fibres: present, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: vasicentric, aliform,

RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm, >12/mm,

- Ray tissues: heterogeneous type III,

MINERÁL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells. - crystalliferous cells: ordinary.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth No.of trees		y g/cm3	Bending strength	Modulus of	Maximum crushingstrength
leste un 政治 (Alamania) et ested	content % Basic density	Air-dry density	MPa	elasticity GPa	MPa .
India	13.4	1.017	133 129.7	14.99 14.21	65 65.0
ans polici Stress at limit	Kardness N. Side grain end grain	Shear paralo	el to grain MPa ·		ce to splittiing N/cm lane T-plane
The state of the s		15.8	3 17.1	1	

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        The little of the sections of
TRADE NAME: Ketapang
                         BOTANICAL NAME: Terminalia catapoa L. (Combretaceae)
LOCAL NAME: Talisai(Ph., Sab.); Indian almond(Ind.)
HABIT OF TREE: large tree.
PHYSICAL PROPERTIES' - Heartwood and Sapwood: distinct. - Heartwood Color: brown, red. - Odour: indistinct.
                    - Grain: interlocked. - Texture: fine. - Weight: moderately heavy. - Shrankage: small.
STRENGTH CLASSES: medium, weak.
SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation:
NATURE DUARBILITY: non-durable. RESISTANCE TO TERMITES: no. AMENABILITY TO PRESERVATIVE TREATMENT: medium.
                                                                                                                   WORKING QUALITIES: easy,
USES: House building, Interior finish. Ship and boat manufacturing, Vehicle, Furniture, Veneer, Plywood.
      Turnery wood, Pulpwood,
GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, China, India,
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GROWTH RINGS: moderately distinct.

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VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, '- Intervessel pits: alternate, vestured pits present.
- Vessel-ray pitting: similar to intervessel pits. Mean T.D.: 100-200um.
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: <350um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: present, - Mean length: 900-1600um, - Wall thickness: thin to thick. AXIAL PARENCHYMA Paratracheal p.: scanty, vasicentric, aliform, confluent, - Banded: 1-3 cells, >3 cells,

- RAYS interconnected (fused) rays. Width: commonly 4-10 seriate. Numbers: 4-12/mm.
- Ray tissues: homogeneous uniseriate and multiseriate, heterogeneous type III.

MINERAL INCLUSIONS - Crystals: Druses or sand crystals present, in axial parenchyma cells, - crystalliferous cells: idioblast,

<i>;</i> • •	Moisture Densi content % Basic density	• -		Modulus of elasticity GPa	•
Malaysia		0.71	73.5 76.6	10.95 10.6	40.3 43.8
proportiona, ity MPa	Hardness N. Side grain ∣ end grain	Shear paral R	el to grain MPa		ce to splittiing N/cm lane T-plane
5.4 may 0.5.7 u.man.		9.1	10.3	1	
May Destroy (b.					

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TRADE NAME: Lanipau
                      BOTANICAL NAME: Terminalia copelandii Elm. (Combretaceae)
LOCAL NAME: Ketapang(In.): Talisai(Sab.)
HABIT OF TREE: large tree.
PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown. - Odour: indistinct.
                   - Grain: straight, oblique. - Texture: medium. - Weight: light. - Shrankage: small, comparatively large.
STRENGTH CLASSES: medium. weak.
SEASONING : - Deformation: slight risk of deformation,
NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no. AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: moderately easy,
USES: Furniture, Veneer, Plywood,
Packing boxes, Turnery wood,
GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, Papua New Guinea,
GROWIH RINGS: moderately distinct.
VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse.
              - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present.
              - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um.
              - Vessel No.: <5/sq.mm. - Vessel element mean length: 350-800um. - Tyloses: present.
FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: present, - Mean length: >1600um, - Wall thickness: very thin, thin to thick,
AXIAL PARENCHYMA - Paratracheal p.: vasicentric, aliform, confluent,
RAYS - Width: 1-3 cells. - Numbers: <4/mm. 4-12/mm. - Ray tissues: homogeneous uniseriate and multiseriate, heterogeneous type III.
MINERAL INCLUSIONS - Crystals: Druses of sand crystals present, in axial parenchyma cells. - crystalliferous cells: idioblast.
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TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth No. of trees tested	Moisture Density content % Basic density A	-	Bending strength	Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines 18 18 18 5	12 0.44	0.546	89.8 82.3	12.0 11.1	45.8 42.3
of the propertional ty American	Hardness N. Side grain end grain	Shear paralel R	to grain MPa	<u> </u>	ce to splittiing N/cm lane T-plane
Controller Charlet Control State Control Control	3650 3322 5170 4705	9.54	9.87		

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BOTANICAL NAME: Terminalia nitens Prest (Combretaceae)
TRADE NAME: Sakat
LOCAL NAME: Mantalisal (Ph.)
HABIT OF TREE: large tree.
PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: yellow. - Odour: indistinct.
      Grain: - Texture: medium, - Weight: moderately heavy, heavy, - Shrankage: comparatively large, very large,
STRENGTH CLASSES: strong, medium,
SEASONING - Air drying rates: slow. - Checking: no risk of checking. - Deformation: no risk of deformation,
NATURE DUARBILITY: non-durable. WORKING QUALITIES:
USES: House building, Durable timber, Ship and boat manufacturing, Vehicle, Furniture,
     Agricultural implement wood, Tool handle, Bedding wood material,
GEOGRAPHIC DISTRIBUTION: Philippines.
GROWTH RINGS: moderately distinct.
VESSELS/PORÉS - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,
             - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present,
            - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: >200,
          - Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: 350-800um,
FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered. - Septate fibres: present. - Mean length: 900-1600um. - Wall thickness: thin to thick.
AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: vasicentric, aliform, confluent,
RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate and multiseriate, heterogeneous type III,
                                         TABLE OF PHYSICAL AND MECHANICAL PROPERTIES
 Locality of growth | No. of trees | Moisture | Density g/cm3 | Bending strength | Modulus of | Maximum crushingstrength
     | Martin | Section | Section | Content % | Basic density | Air-dry density |
                                                                                       | elasticity GPa |
                                                                      | 87.0 79.8 | 12.1 11.2 |
  Philippiness in the process
                                                           0.705
 Stress at limit dead. Hardness N.
                                                       Shear paralel to grain MPa
                                                                                            Resistance to splitting N/cm
    proportionality....MPa | Side grain | end grain |
      13-29 at 11-45 density 5510 5014 8370 7617
       sound of constitution contact in account
      ee, Cabillik (Builder) en een ee
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TRADE NAME: Rokfa BOTANICAL NAME: Terminalia tomentosa Wight & Arn (Combretaceae) LOCAL NAME: Laurel(Bur.): Cam lien(Viet.): Chhilik(Cam.) HABIT OF TREE: large tree, PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: brown, purple, with streaks. - Odour: indistinct. - Grain: straight, oblique, - Texture: medium, - Weight: heavy. - Shrankage: large. STRENGTH CLASSES: strong. SEASONING . - Air drying rates: - Checking: slight risk of checking. - Deformation: NATURE DUARBILITY: durable. WORKING QUALITIES: moderately difficult. USES: House building. Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, : Agricultural implement wood, GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, Burma, Thailand, India. GROWTH RINGS: distinct. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates; simple. - Intervessel pits; alternate. - vestured pits present. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: >200, - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: present, - Mean length: >1600um, - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: aliform, confluent, - Banded: 1-3 cells, RAYS - Width: exclusively uniseriate, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, Styloid crystals present, in axial parenchyma cells, - crystalliferous cells: chambered, TABLE OF PHYSICAL AND MECHANICAL PROPERTIES Locality of growth (No. of trees Moisture | Density g/cm3 | Bending strength | Modulus of | Maximum crushingstrength tested | content % | Basic density | Air-dry density | MPa | elasticity GPa | MPa

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TRADE NAME: Malasambong-gubat BOTANICAL NAME: Vernonia arborea Hem. (Compositae) LOCAL NAME: Medang Lempong, Menggambong (M.) HABIT OF TREE: medium tree, PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: yellow, - Odour: indistinct. .- Grain: straight. - Texture: medium. - Weight: light. - Shrankage: STRENGTH CLASSES: weak, SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no. WORKING QUALITIES: easy. USES: Wood based panel. Household appliance, Carvinge, GEOGRAPHIC DISTRIBUTION: GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple. /- Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Paratracheal p.: vasicentric, aliform, confluent, RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type II. - Sheath cells present.

Locality of growth No.of trees	Moisture Densit content % Basic density	ty g/cm3 Air-dry density	Bending strength MPa -	Modulus of elasticity GPa	Maximum crushingstrength MPa
Indonesia	12.5	0.353	36 36.8		22.8 21.7
	Hardness N. Side grain ∣ end grain				ce to splittiing N/cm
1				1	

TRADE NAME: Apanit

BOTANICAL NAME: Mastixia philippinensis Wang (Cornaceae)

LOCAL NAME:

HABIT OF TREE: medium tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: yellow, - Odour: indistinct,

.- Grain: straight. - Texture: fine. - Weight: light. - Shrankage: large.

STRENGTH CLASSES: very weak,

SEASONING - Air drying rates: - Checking: - Deformation:

NATURE DUARBILITY: WORKING QUALITIES:

USES: Wood based panel.

Pulpwood, Disposable chopsticks etc.,

GEOGRAPHIC DISTRIBUTION: Philippines,

GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: scalariform, Intervessel pits: opposite-scalariform, scalariform,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 50-100um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick.

AXIAL PARENCHYMA - Aportracheal p.: diffuse. diffuse-in-aggregates. - Paratracheal p.: scanty.

RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type II,

MISCELLANEOUS: Axial intercellular canals in short tangential lines,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of grow		•			•	Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines	1	12 '	. 0.49	0.614	99.0 90.8	11.8 10.9	49.1 45.4
				Shear paral	el to grain MPa		ce to splittiing N/cm lane T-plane
5.87	5.08	4040 3676	5940 5405	9.8	0 10.1		

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TRADE NAME: Tiaui BOTANICAL NAME: Crypteronia paniculata Bl. (Crypteroniaceae) LOCAL NAME: Bekoi, Tiliga badak (M.) Loi (Viet): Trap toum (Cam.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown. red. - Odour: indistinct. - Grain: straight. - Texture: fine - Weight: moderately heavy. - Shrankage: STRENGTH CLASSES: medium. SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: moderately durable. WORKING QUALITIES: USES: House building, Interior finish. GEOGRAPHIC DISTRIBUTION: Vietnam, Laos, Malaysia, Indonesia, China, India, GROWTH RINGS: moderately distinct, indistinct or absent, VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern, in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: 5-20/sg.ππ. - Vessel element mean length: 350-800μm. FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, terminal, - Paratracheal p.: scanty, - Banded: 1-3 cells, RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: >12/mm, - Ray tissues: heterogeneous type II.

Locality of growth No.of trees tested	Moisture Densit				
	1 1		•		
Stress at limit proportionality MPa	Hardness N. Side grain end grain				
	./			1	

TRADE NAME: Mertas BOTANICAL NAME: Ctenolophon parvifolius Oliv. (Ctenolophonaceae)
LOCAL NAME: Besi-besi (Sab.); Litoh (Sar); Adau (Br); Lasah, Madjuit, ukut (In.).

HABIT OF TREE: medium tree, large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: brown, red, - Odour: indistinct,

- Grain: interlocked, wayy. - Texture: fine. - Weight: heavy. - Shrankage: small.

STRENGTH CLASSES: strong.

SEASONING - Air drying rates: moderately fast, - Checking: slight risk of checking, - Deformation:

NATURE DUARBILITY: moderately durable. WORKING QUALITIES: moderately difficult.

USES: House building, Interior finish, Durable timber,

GEOGRAPHIC DISTRIBUTION: Brunei, Malaysia, Indonesia,

GROWTH RINGS: moderately distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Vessel grouping: exclusively solitary. Perforation plates: scalariform. Intervessel pits: extremely rare or absent,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.:
- Vessel No.: Vessel element mean length: Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: - Wall thickness: very thick,

AXIAL PARENCHYMÀ - Aportracheal p.: diffuse-in-aggregates. - Paratracheal p.: scanty.

- RAYS interconnected (fused) rays, Width: 1-3 cells, commonly 4-10 seriate, Numbers: 4-12/mm, >12/mm,
 - Ray tissues: heterogeneous type I, heterogeneous type II,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary, chambered,

Locality of growth	•			y g/cm3 Air-dry density	•	Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia	3	16.3	0.76	0.945	122 133	18.1 18.0	61.6 71.3
Stress at l proportionality			ness N. end grain	Shear paral	el to grain MPa	,	ce to splittiing N/cm lane T-plane
,	1	9920 10307		, 14.	9 17.6	53	58

TRADE NAME: Binuang BOTANICAL NAME: Octomeles sumatrana Miq. (Datiscaceae)

LOCAL NAME: Benuang (In.): Ilimo, Erima (N. G.)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: yellow, brown, - Odour: indistinct,

- Grain: oblique, interlocked. - Texture: medium, - Weight: very light, - Shrankage: large,

STRENGTH CLASSES: very weak,

SEASONING - Air drying rates: slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable. RESISTANCE TO TERMITES: no. AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: easy,

USES: Veneer, Plywood,

Matches, Buoys,

GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Philippines, Indonesia, Indo-china, Papua New Guinea,

GROWIH RINGS: indistinct or absent,

VESSELS/PORÉS - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: >200,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: very thin,

AXIAL PARENCHYMA - Paratracheal p.: vasicentric, aliform, confluent,

RAYS - Width: commonly 4-10 seriate. - Numbers: <4/mm. 4-12/mm. - Ray tissues: heterogeneous type II. heterogeneous type III.

Locality of growth	•	•	ure Den nt % Basic densit		-	•		Maximum crushingstrength MPa
Philippines	4	12	0.27	0.318	41.7	41.7	[7.00 6.02	24.2 22.4
	limit y MPa		Kard∩ess N. rain end grain	<u>'</u>	paralel to grain		•	ce to splittiing N/cm lane .T-plane
2.17	1.88	1490	1356 , 2820 2	566	3.84 3.97	,	· 1	

TRADE NAME: Mengkunder BOTANICAL NAME: Tetrameles nudiflora R. Br. (Datiscaceae) LOCAL NAME: Kundur, Binung(In.): Sompong(Cam. Th.): Tung(Viet): Baing(Bur.): Maina(Ind. Pak.): Kapong (Th.) HABIT OF TREE: large tree. .PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: yellow, - Odour: indistinct, - Grain: interlocked. - Texture: medium. - Weight: very light. light. - Shrankage: STRENGTH CLASSES: weak. SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: non-durable. WORKING QUALITIES: easy, USES r Veneer. Plywood. Packing boxes, Food containers, Matches, GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, Thailand, Malaysia, Indonesia, Papua New Guinea, China, India, Sri Lanka, GROWTH RINGS: moderately distinct, indistinct or absent, VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern, in diffuse. - Perforation plates: simple, - Intervessel pits: alternate, - Vessel-ray pitting: large, gash-like. - Mean T.D.: 100-200um. - Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: 350-800um, FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered. - Mean length: 900-1600um. - Wall thickness: very thin. AXIAL PARENCHYMA - Paratracheal p.: vasicentric, aliform, RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III. MISCELLANEOUS: Axial parenchyma storied, Fibres storied,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth		•					Maximum crushingstrength MPa
Stress at lim	nit		ness N.	Shear paral	56.95 el to grain MPa	Resistan	35.6 ce to splittiing N/cm lane T-plane
proporcionaticy	·	side grain	end grann	8.2	9.5		tane 1-ptane

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TRADE NAME: Katmon BOTANICAL

BOTANICAL NAME: Dillenia philippinensis Rolfe (Dilleniaceae)

LOCAL NAME:

HABIT OF TREE: medium tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: red, purple, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: medium, coarse, - Weight: moderately heavy, heavy, - Shrankage: large,

STRENGTH CLASSES: strong, medium,

SEASONING - Air drying rates: - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately difficult,

USES: House building, Interior finish, Durable timber, Furniture, Plywood,

Agricultural implement wood, Packing boxes, Wood mould, Matches, Fuel, Pulpwood,

GEOGRAPHIC DISTRIBUTION: Philipoines.

GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Vessel grouping: exclusively solitary, - Perforation plates: scalariform, - Intervessel pits:

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- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sg.mm. Vessel element mean length: >800um.

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Septate fibres: present, - Mean length: >1600um, - Wall thickness: thin to thick, very thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty,

RAYS - rays of two distinct sizes, - Width: commonly 4-10 seriate, - Numbers: 4-12/mm,

- Ray tissues: heterogeneous type II,

MINERAL INCLUSIONS - Crystals: Raphides crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary,

Locality of growth						Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines	. 1	12	0.65	0.750			41.2 38.1
Stress at lim proportionality		Hardne Side grain				•	e to splittiing N/cm ane T-plane
12.2 10.	.6] 6	530 5942	8830 8035	13.7	14.2	1	

TRADE NAME: Mersawa BOTANICAL NAME: Anisoptera marginat Korth. (Dipterocarpaceae)

LOCAL NAME: Mersawa paya (P. M.); Pengiran kerangas (Sab.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: yellow, brown, - Odour: indistinct,

- Grain: straight to fairly interlocked. - Texture: medium. - Weight: moderately heavy. - Shrankage: small.

STRENGTH CLASSES: medium.

SEASONING - Air drying rates: very slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: durable. AMENABILITY TO PRESERVATIVE TREATMENT: low. WORKING QUALITIES: moderately easy.

USES: House building, Interior finish, Ship and boat manufacturing, Vehicle, Furniture, Veneer, Plywood,

Packing boxes.

GEOGRAPHIC DISTRIBUTION: Brunei, Malaysia, Indonesia,

GROWTH RINGS: distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Vessel grouping: exclusively solitary. - Perforation plates: simple. - Intervessel pits: extremely rare or absent. - vestured pits present.

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- Vessel-ray pitting: large, rounded, - Mean T.D.: >200,

- Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: 350-800um.

.FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered. - Mean length; >1600um. - Wall thickness; very thick.

TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: vasicentric, aliform, - Banded: 1-3 cells, ""

RAYS - Width: commonly 4-10 seriate. - Numbers: <4/mm. 4-12/mm. - Ray tissues: heterogeneous type II. heterogeneous type III. - Sheath cells present.

MINERAL INCLUSIONS - Silica: present in ray cells.

4. 4

MISCELLANEOUS: Axial intercellular canals in short tangential lines,

Axial intercellular canals in diffuse,

Locality of growth No. of trees Moisture Density ! tested content % Basic density A	•	•	Maximum crushingstrength MPa
Malaysia 2 97 0.55	0.675 54 98	12.6 13.0	28.9 53.6
Stress at limit Hardness N. proportionality MPa Side grain end grain	Shear paralel to grain MPa R T	Resistan R-P	ce to splittiing N/cm lane T-plane
5.52 6.0 4180 5302	7.1 12.4	51	66 .

TRADE NAME: Kiam BOTANICAL NAME: Cotylelobium melanoxylon (Hook, f.) Pierre (Dipterocarpaceae) LOCAL NAME: Resak, Resak Tempurong (M. Sab.): Giam, Giam hitam, Giam tembaga (In.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: yellow, brown, - Odour: indistinct, - Grain: straight, oblique. - Texture: fine. - Weight: very heavy. - Shrankage: STRENGTH CLASSES: strong, SEASONING - Air drying rates: moderately slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: very duarble. RESISTANCE TO TERMITES: ves. WORKING QUALITIES: moderately difficult. USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Textile timber, Furniture, Culture, Cooperage, Turnery wood, Bedding wood material, GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Indonesia, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern, in diffuse. - Vessel grouping: exclusively solitary, - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present. - Vessel-ray pitting: large, gash-like, - Mean T.D.: 100-200um, - Vessel:No.: 5-20/sg.mm. - Vessel element mean length: 350-800um. - Tyloses: present. FIRRES AND FIRRE TRACHFIDS - Pits: distinct bordered. - Mean length: 900-1600um. - Wall thickness: very thick. TRACHEIDS: vasicentric. AXIAL PARENCHYMA - Aportracheal p.: diffuse diffuse in aggregates. - Paratracheal p.: scanty, vasicentric. - Banded: 1-3 cells. RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III. MINERAL INCLUSIONS - Silica: present in ray cells, MISCELLANEOUS: Axial intercellular canals in short tangential lines. Axial intercellular canals in diffuse,

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Loca	ality of growth		Moisture content % Ba									:h
lr	ndones i a		13.7	1.09	9	134.8	133.1	18.63	17.73	68.2 [.]	69.3	
	Stress at l proportionality		Hardne Side grain					R		•	ittiing N/cm T-plane	
		, ,		 6.7	7.4	7.3	8.1	1			• • • • • • • • • • • • • • • • • • • •	

TRADE NAME: Keruing BOTANICAL NAME: Dipterocarpus grandiflorus Blanco (Dipterocarpaceae)
LOCAL NAME: Apitong (Ph.): Keruing Belimbing (M. N.B.): Hieng (Th.) Guriun (Ind.)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: brown, red. - Odour: distinct.

- Grain: straight. - Texture: medium. - Weight: moderately heavy, heavy. - Shrankage: very large.

STRENGTH CLASSES: medium,

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable, ... AMENABILITY TO PRESERVATIVE TREATMENT: good, ... WORKING QUALITIES: moderately easy,

USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Plywood, Wood based panel,

Cooperage, Pulpwood,

GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Philippines, Indonesia, India,

GROWTH RINGS: indistinct or absent.

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VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,

- Vessel grouping: exclusively solitary, - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present,

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- Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: >200,

- Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered. - Mean length: >1600um. - Wall thickness: very thick.

TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, vasicentric,

RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, - Sheath cells present,

MISCELLANEOUS: Axial intercellular canals in short tangential lines.

Axial intercellular canals in diffuse.

•	f trees Moisture ested content % Be		-	-		Maximum crushingstrength MPa
Malaysia	1 18.1	0.66	0.800	98 115	17.6 17.9	51.8 65.0
•	a Side grain	ss N. end grain	Shear paralel R	l to grain MPa		ce to splittiing N/cm lane T-plane
5.38 6.13	5160 5640	· · · · · · · · · · · · · · · · · · ·	10.3	12.8	53	57

TRADE NAME: Kapur BOTANICAL NAME: Dryobalanops aromatica Gaerth. f. (Dipterocarpaceae)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: red, - Odour: distinct,

-- Grain: interlocked, - Texture: medium, - Weight: heavy, - Shrankage: comparatively large,

STRENGTH CLASSES: strong,

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: moderately durable, RESISTANCE TO TERMITES: no, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately difficult,

USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, Plywood,

Packing boxes, Tool handle,

GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia,

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GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse.

- Vessel grouping: exclusively solitary, Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: 350-800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: very thick,

TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: vasicentric, aliform, - Banded: 1-3 cells,

RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, - Sheath cells present,

MINERAL INCLUSIONS - Silica: present in ray cells, present In axial parenchma cells,

MISCELLANEOUS: Axial intercellular canals in long tangential lines, Axial intercellular canals in short tangential lines,
Axial intercellular canals in diffuse.

Locality of g	rowth No.of trees										crushingstrength MPa
Malaysia	5	15.9	0.65	. 0.800	1	14	123	18.7	18.4	61.7	70.1
	s at limiton nality MPa			Shea	r paralel to	grain	MPa T	1		•	ittiing W/cm T-plane
5.52	5.74	5560 5710			10.5	12.3			56		56

TRADE NAME: Giam : BOTANICAL NAME: Hopea nutens Ridl. (Dipterocarpaceae)

LOCAL NAME: Chengal batu (P. M.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: yellow, brown, green, - Odour: indistinct,
- Grain: interlocked. - Texture: medium. - Weight: very heavy. - Shrankage: comparatively large.

STRENGTH CLASSES: very strong,

SEASONING - Air drying rates: very slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: very duarble, RESISTANCE TO TERMITES: yes, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: difficult,

USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle,

Cooperage, Oil press, Friction blocks, Bedding wood material,

GEOGRAPHIC DISTRIBUTION: Brunei, Malaysia.

GROWTH RINGS: indistinct or absent.

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VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: Mean T.D.: >200,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: - Wall thickness: very thick, -

TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: vasicentric, aliform, confluent, - Banded: 1-3 cells, RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, - Tile cells: Durio-Pterospermum type,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: ordinary, chambered,

MISCELLANEOUS: Rays storied, Axial parenchyma storied, Axial intercellular canals in long tangential lines, Axial intercellular canals in diffuse.

					Densit Basic density								
Malaysia	: 1	5	4	2	0.84	1.025	۰	109	156	17.9	20.8	66.9	86.3
		t · MPa				Shear R	paralel	to grain	MPa T			e to splittii ane T-p	•
13.45	ı 12.0		9660	11370		1	13.4	18.8			98	110	5

TRADE NAME: Merawan BOTANICAL NAME: Hopea odorata Roxb. (Dipterocarpaceae) LOCAL NAME: Merawan siput jantan, Chengal pasir, Chengal kampong, Chengal pulau. Chengal mas(M.): Takhiantong(Th.): White thingan, Safed thingan(Ind.): Sauchi, Sawkwai, Thi nsingan. Thingan Net(Bur.): Sao(Viet): Koki(Cam.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, indistinct. - Heartwood Color: vellow, brown. - Grain: - Texture: fine. - Weight: moderately heavy, heavy, - Shrankage: STRENGTH CLASSES: medium. SEASONING - Air drying rates: moderately slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: durable. RESISTANCE TO TERMITES: moderately, AMENABILITY TO PRESERVATIVE TREATMENT: low, USES: House building, Interior finish, Ship and boat manufacturing. Vehicle. Furniture, Veneer. Plywood. Cooperage, Household appliance. GEOGRAPHIC DISTRIBUTION: Viëtnam, Laos, Cambodia, Burma, Thailand, Malaysia, China, Bangladesh, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present. - Vessel-ray pitting: large, rounded, - Mean T.D.: 100-200um,

- Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick, very thick,

TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: vasicentric, aliform, confluent,

RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, - Sheath cells present, - Tile cells: Durio type,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary,

MISCELLANEOUS: Axial parenchyma storied, Axial intercellular canals in long tangential lines.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

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Locality of growth					Modulus of Maximum crushingstrength elasticity GPa MPa
India	1 :	1		94.51	11.47 46.27
		Hardness N. Side grain ∣ end grain			Resistance to splittiing N/cm R-Plane T-plane
	. i				1

TRADE NAME: Chengal BOTANICAL NAME: Neobalanocarpus heimii Ashton (Dipterocarpaceae)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: brown, purple, - Odour: indistinct,

- Grain: interlocked, - Texture: fine, - Weight: heavy, very heavy, - Shrankage: small,

STRENGTH CLASSES: strong,

SEASONING - Air drying rates: slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: very duarble, RESISTANCE TO TERMITES: yes, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately easy,

USES: House building, Durable timber, Ship and boat manufacturing, Vehicle,

Cooperage, Tool handle,

GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia,

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse.

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: large, rounded. Mean T.D.: 100-200um.
- Vessel No.: 5-20/sq.mm. Vessel element mean length: 350-800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: 900-1600um, - Wall thickness: very thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, terminal, - Paratracheal p.: scanty, vasicentric, aliform, confluent,

RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III, - Sheath cells present,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary, - Silica: present in ray cells,

MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied, Axial intercellular canals in long tangential lines,

Locality of growth No. of tree	content % Basic density	Air-dry density	-	·	
Malaysia 5	15.6 0.78		149 159	19.6 19.2	75.2 84.2
Stress at limit		•	-		e to splittiing N/cm ane T-plane
12.0 12.3	9480 9651	13.	9 16.1	55	49

TRADE NAME: White serava BOTANICAL NAME: Parashorea malaanonan Merr. (Dipterocarpaceae) LOCAL NAME: Bagtikan, Southern batikan, White layan, Tiaong, Danlig (Ph.); Urat mata (Sab. Sar.); Urat mata daun Lichin (Sab.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown, red. - Odour: indistinct, - Grain: interlocked, - Texture: medium, - Weight: light, moderately heavy, - Shrankage: comparatively large, large, STRENGTH CLASSES: weak. SEASONING - Air drying rates: moderately slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: non-durable. AMENABILITY TO PRESERVATIVE TREATMENT: low. WORKING QUALITIES: moderately easy, USES: Interior finish. Ship and boat manufacturing, Plywood, Wood mould. GEOGRAPHIC DISTRIBUTION: Brunei, Malaysia, Philippines, Indonesia, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: large, rounded. - Mean T.D.: 100-200um.

- Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: very thin,

TRACHEIDS: vasicentric,: AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: vasicentric, aliform,

RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type III, heterogeneous type III,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary, chambered,

MISCELLANEOUS: Axial parenchyma storied, Axial intercellular canals in long tangential lines,

Locality of growth				ty g/cm3 Air-dry density		Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines	22	12	0.49	0.591	92.4 84.7	12.9 12.0	48.1 44.4
Stress at li proportionality	imit: MPa		ness N. end grain	•	el to grain MPa	. •	ce to splittiing N/cm lane T-plane
6.36 5	.50 3	3720 3385	3840 349	4 9.4	6 9.78	1	

TRADE NAME: Thingadu BOTANICAL NAME: Parashorea stellata kurz. (Dipterocarpaceae) LOCAL NAME: Gerutu, Gertu-gerutu, Meranti Gerutu (M.) Cho-chi (Viet); Tayoy Wood (Bur. Ind.); May cho chi (Laos) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: yellow, brown. - Odour: indistinct. - Grain: oblique. - Texture: coarse. - Weight: moderately heavy. - Shrankage: large. STRENGTH CLASSES: medium. SEASONING - Air drying rates: slow. - Checking: slight risk of checking. - Deformation: NATURE DUARBILITY: non-durable. AMENABILITY TO PRESERVATIVE TREATMENT: medium. WORKING QUALITIES: moderately easy. USES: House building, Interior finish, Ship and boat manufacturing, Furniture, Plywood, Packing boxes. GEOGRAPHIC DISTRIBUTION: Vietnam, Laos, Cambodia, Burma, Thailand, Malaysia, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse, - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present, - Vessel-ray pitting: large, rounded. - Mean T.D.: >200. - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: >1600um. - Wall thickness: thin to thick. TRACHEIDS: vasicentric. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: vasicentric, aliform, confluent, RAYS - Width: commonly 4-10 seriate. - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type III, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary, chambered, MISCELLANEOUS: Axial parenchyma storied, Axial intercellular canals in long tangential lines,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

ocality of growth No.of trees	Moisture Densi content % Basic density	ty g/cm3 Air-dry density	Bending strength MPa	Modulus of elasticity GPa	Maximum crushingstrength MPa
India	1		101.0	15.39	57.94
	Hardness N. Side grain ∣ end grain	Shear parale R	l to grain MPa	•	e to splittiing N/cm nne T-plane
5 6Å 1				 	

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TRADE NAME: White lauan BOTANICAL NAME: Shorea contorta Vidal (Dipterocarpaceae)

LOCAL NAME: Dangog, Danlig, Hapnit, Miadanao White Lauan (Ph.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: brown, red, - Odour: indistinct,

- Grain: interlocked, - Texture: coarse, - Weight: light, - Shrankage: comparatively large,

STRENGTH CLASSES: weak,

SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation:

NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no, AMENABILITY TO PRESERVATIVE TREATMENT: medium, WORKING QUALITIES: moderately easy,

USES: Interior finish, Ship and boat manufacturing, Furniture, Veneer, Plywood,

Wood mould, Pulpwood,

GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines,

GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: large, rounded, Mean T.D.: >200,
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: 350-800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick,

TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: vasicentric, aliform, confluent,

RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type III, - Sheath cells present,

MISCELLANEOUS: Axial intercellular canals in long tangential lines,

Locality of growth No. of tree	es Moisture Densit content % Basic density			Modulus of Max elasticity GPa	ximum crushingstrength MPa
Philippines : 19	12 0.43	0.512	80.6 80.6	11.7 10.1	41.8 38.6
proportionality MPa	Hardness N. Side grain end grain	Shear paralo	el to grain MPa		o splittiing N/cm T-plane
5.23 :4.52 :	3140 2857 3530 3212	2 8.20	6 8.54	1	

TRADE NAME: Yellow merianti BOTANICAL NAME: Shorea faquetiana Heim (Dipterocarpaceae) LOCAL NAME: Damar hitam siput. Seraya kuning siput (M.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: yellow, brown, - Odour: indistinct, - Grain: interlocked. - Texture: medium. - Weight: light. moderately heavy. - Shrankage: large, STRENGTH CLASSES: weak. SEASONING - Air drying rates: moderately slow. - Checking: - Deformation: slight risk of deformation. NATURE DUARBILITY: non-durable, ... RESISTANCE TO TERMITES: no, ... AMENABILITY TO PRESERVATIVE TREATMENT: low. WORKING QUALITIES: easy. USES: House building, Interior finish, Ship and boat manufacturing, Furniture, Veneer, Plywood, GEOGRAPHIC DISTRIBUTION: Brunei, Malaysia, Indonesia, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. ig v j. Vessel-ray pitting: large, rounded, - Mean T.D.: 100-200um, Vessel No.: 5-20/sq.mm, - Vessel element mean length: - Tyloses: present, FIRRES AND FIBRE TRACHEIDS - Pits: - Mean length: - Wall thickness: thin to thick. TRACHEIDS; vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse-in-aggregates. - Paratracheal p.: vasicentric. aliform. RAYS - Width: commonly 4-10 seriate. - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, - Sheath cells present, - Radial intercellular canals present, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary, chambered, idioblast, MISCELLANEOUS: Axial intercellular canals in long tangential lines,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

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Locality of growth No. of trees	s Moisture Densit content % Basic density			Modulus of elasticity GPa	
Malaysia : 2	102 0.44	0.530	60 75	10.7 10.0	32.8 41.2
Stress at limit proportionality MPa	Hardness N. Side grain end grain	Shear paral	el to grain MPa T	<u>.</u>	ce to splittiing N/cm lane T-plane
3:86 : 92:3.7	3110	6.4	9.9	49	62

TRADE NAME: Red Balau BOTANICAL NAME: Shorea guiso Bl. (Dipterocarpaceae)

LOCAL NAME: Membatu, Chengal pasir(M.); Selangan Batu merah(Br. Sab. Sar.); Salanga batu(Sab.); Red selangan(Sar.) Guijo(ph.); Chai(Viet.); Chor chorg(Cam.); Giso, Balau merah, Bangkirai(In.)

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HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, distinct, - Heartwood Color: red, - Odour: indistinct, - Grain: interlocked, - Texture: medium, - Weight: moderately heavy, heavy, - Shrankage: large,

STRENGTH CLASSES: very strong, strong,

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation, NATURE DUARBILITY: moderately durable, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately easy, USES: House building, Interior finish, Durable timber, Furniture.

GEOGRAPHIC DISTRIBUTION: Vietnam, Laos, Cambodia, Thailand, Malaysia, Philippines, Indonesia, GROWTH RINGS: distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: large, rounded, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,
TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: aliform, confluent,
RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, - Sheath cells present,
MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: chambered,
MISCELLANEOUS: Axial intercellular canals in long tangential lines,

Locality of grow	th No.of trees	Moisture content %	Densit Basic density	y g/cm3 Air-dry density	Bending strength MPa .	Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia	:+6	16.9	0.60	0.755	100 113	14.8 14.8	52.2 62.2
	t limit ity MPa		•	Shear paral R	el to grain MPa	:	ce to splittiing N/cm lane T-plane
5.52	5.99	5920 6257		12.	0 14.4	[65	77

TRADE NAME: White meranti BOTANICAL NAME: Shorea hypochra Hance (Dipterocarpaceae)
LOCAL NAME: Meranti Temak, Meranti Terbak, Temak (M.) Bo-bo (Viet.); Komphan(Cam.)

HABIT OF TREE: large tree,

the same and

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: yellow, brown, - Odour: indistinct,

- Grain: - Texture: medium, - Weight: moderately heavy, - Shrankage: small,

STRENGTH CLASSES: medium,

W. J. A. W. Mr. 51.

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no, AMENABILITY TO PRESERVATIVE TREATMENT: Low, WORKING QUALITIES: moderately difficult,

USES: House building, Interior finish, Ship and boat manufacturing, Furniture, Plywood,

GEOGRAPHIC DISTRIBUTION: Laos, Cambodia, Thailand, Malaysia, Indonesia,

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: large, rounded, Mean T.D.: >200,
- Vessel No.: 5-20/sq.mm. Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered. - Mean length: 900-1600um. - Wall thickness: thin to thick.

TRACHEIDS: vasicentric. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: aliform, confluent,

RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III,

MINERAL INCLUSIONS - Silica: present in ray cells,

MISCELLANEOUS: Axial intercellular canals in long tangential lines;

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

tested to the state of the stat	es Moisture Densit			
Malaysia 5		0.690 97	104 15.7 15.4	51.7 58.2
proportionality MPa	Side grain end grain	Shear paralel to grain		nce to splittiing N/cm Plane T-plane
5.93 6.12	5250 5360	[10.0 11.6	5 41	44

TRADE NAME: Balau BOTANICAL NAME: Shorea laevis Ridl. (Dipterocarpaceae)
LOCAL NAME: Balau kumus (P. M.). Salangan Batu (Sar.); Salanga Batu kumus (Sab.)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: yellow, brown, - Odour: indistinct, - Grain: interlocked, - Texture: fine, - Weight: heavy, very heavy, - Shrankage: small,

STRENGTH CLASSES: very strong.

SEASONING - Air drying rates: very slow, - Checking: hight risk of checking, - Deformation: hight risk of deformation,

NATURE DUARBILITY: very duarble, AMENABILITY TO PRESERVATIVE TREATMENT: Low, WORKING QUALITIES: difficult,

USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Furniture,

GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Indonesia, India,

GROWTH RINGS: moderately distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: large, rounded, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sg.mm. Vessel element mean length: 350-800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick, very thick,

TRACHEIDS: vasicentric; AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, aliform, confluent,

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, - Sheath cells present,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: chambered, idioblast,

MISCELLANEOUS: Axial intercellular canals in long tangential lines,

TARLE OF	PHYSICAL	AND	MECHANICAL	PROPERTIES

Locality of growt	th No.of tree	content % Bas	Density	y g/cm3		Modulus of elasticity GPa	Maximum crushingstrength MPa
·			0.80	0.960	142 151	20.1 19.7	76.0 85.1
proportional		Side grain					ce to splittiing N/cm lane T-plane
9.79	10.05	10010 10190		15.0	17.4	65	72

TRADE NAME: Dark red meranti BOTANICAL NAME: Shorea pauciflora King (Dipterocarpaceae) LOCAL NAME: Nemusu (M.) Obar suluk (Sab.): Meranti merah. Meranti Ketuko (In.) 7 / 7 3 5 HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct: indistinct. - Heartwood Color: red. - Odour: indistinct. - Grain: interlocked - Texture: medium - Weight: light moderately heavy - Shrankage: small comparatively large, large. STRENGTH CLASSES: medium, weak. SEASONING - Air drying rates: moderately fast. - Checking: no risk of checking. - Deformation: no risk of deformation. NATURE DUARBILITY: moderately durable. AMENABILITY TO PRESERVATIVE TREATMENT: Low. WORKING QUALITIES: easy. USES: Interior finish, Furniture, Veneer, Plywood, Wood mould .: GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Indonesia. GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: large, rounded. - Mean T.D.: >200. - Vessel No.: <5/sq.mm. 5-20/sq.mm. - Vessel element mean length: 350-800um. - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick, TRACHEIDS: vasicentric. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: vasicentric, aliform, confluent, - Banded: 1-3 cells, RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: chambered, idioblast, MISCELLANEOUS: Axial intercellular canals in long tangential lines.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

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ocality of growth No.of tree	•	•		ulus of Maximum crushingstre icity GPa MPa	ength
Philippines 2		0.398 67.9	67.9 11.	9.46 34.3 31.7	
· ·	Hardness N. Side grain end grain	Shear paralel to gr	•	Resistance to splittiing N/o	cm
3.54 6 3.06	1650 1502 2830 2575	5.59	5.78		

BOTANICAL NAME: Shorea polita Vidal (Dipterocarpaceae) TRADE NAME: Yellow lauan LOCAL NAME: Malaanonang: Lauan-puti (Ph.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: yellow, - Odour: indistinct, - Grain: interlocked. - Texture: medium. - Weight: light. - Shrankage: small. STRENGTH CLASSES: weak. SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: moderately durable. AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: easy. USES: House building, Interior finish, Furniture, Veneer, Plywood, Packing boxes. GEOGRAPHIC DISTRIBUTION: Philippines. GROWIN RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: large, rounded, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sg.mm. - Vessel element mean length: 350-800um. - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered. - Mean length: 900-1600um. - Wall thickness: thin to thick. TRACHEIDS: vasicentric. AXIAL PARENCHYMA - Paratracheal p.: vasicentric. aliform. confluent. RAYS - Width: commonly 4-10 seriate. - Numbers: 4-12/mm. - Ray tissues: heterogeneous type II. heterogeneous type III. - Sheath cells present. MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells. - crystalliferous cells: ordinary. MISCELLANEOUS: Axial parenchyma storied, Axial intercellular canals in long tangential lines,

Locality of growth No.of tree	es Moisture Densit content % Basic density			Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines 4	12 0.47	0.603	89.1 81.7	11.1 10.3	41.8 38.6
Stress at limit proportionality MPa	Nardness N. Side grain end grain	Shear paral	el to grain MPa T	• •	ce to splittiing N/cm lane T-plane
6.88 5.95	3830 3485 5120 4659	9 9.5	9 9.92	l	

TRADE NAME: Light red meranti BOTANICAL NAME: Shorea teysmanniana Dyer ex Brandis (Dipterocarpaceae) LOCAL NAME: Meranti bunga (M.); Serraya bunga (Sab.); Tiaong (Ph.) HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: brown, red. - Odour: indistinct. - Grain: interlocked. - Texture: coarse. - Weight: light, moderately heavy. - Shrankage: large. STRENGTH CLASSES: weak.

SEASONING: - Air drying rates: - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: non-durable. RESISTANCE TO TERMITES: no.

AMENABILITY TO PRESERVATIVE TREATMENT: low. WORKING QUALITIES: easy,

USES: House building, Interior finish, Furniture, Plywood,

Packing boxes, Wood mould,

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GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, GROWTH RINGS: moderately distinct, indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse.

- Perforation plates: simple. - Intervessel pits: alternate, - vestured pits present,

- Vessel-ray pitting: large, rounded, - Mean T.D.: >200,

- Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick, TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse-in-aggregates, - Paratracheal p.: vasicentric, aliform, confluent, RAYS - Width: commonly 4-10 seriate. - Numbers: <4/mm. 4-12/mm. - Ray tissues: heterogeneous type II. heterogeneous type III. - Radial intercellular canals present, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: chambered, idioblast, MISCELLANEOUS: Axial intercellular canals in long tangential lines,

cality of growth No.of tree	•	sity g/cm3		-	Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia 2	83 0.42	0.510	46	71	10.6 9.5	23.6 39.0
stress at limit proportionality MPa	Hardness N. Side grain end grain	•	lel to grain	MPa T	U	nce to splittiing N/cm Plane T-plane
2.33 3.3	2580	5.	3 9.5	<u>.</u>	31	. 36

TRADE NAME: Resak BOTANICAL NAME: Vatica mangachapoi Blanco (Dipterocarpaceae)

LOCAL NAME: Resak julong (Sar. Br.); Resak bajau (Sab.) Narig (Ph.)

HABIT OF TREE: medium tree, large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: brown, - Odour: indistinct,

- Grain: straight, oblique. - Texture: very fine. - Weight: heavy, - Shrankage: comparatively large,

SEASONING - Air drying rates: moderately slow, - Checking: - Deformation:

NATURE DUARBILITY: very duarble, RESISTANCE TO TERMITES: yes, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: very difficult, USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Textile timber, Culture,

1. - 1. Sept. 11.

Cooperage, Turnery wood, Bedding wood material,

GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Philippines, China,

GROWTH RINGS: indistinct or absent.

STRENGTH CLASSES: strong.

12.1

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern,

- Vessel grouping: exclusively solitary, - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present,

San Andrews

- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sg.mm. Vessel element mean length: 350-800um. Tyloses: present.

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered; - Mean length: 900-1600um, - Wall thickness: very thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty,

RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II,

MISCELLANEOUS: Axial intercellular canals in short tangential lines,

Axial intercellular canals in diffuse.

Locality of growth	•		•				cm3 dry density			Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines	9		12		0.66		0.875	134	123	17.4 16.1	65.2 60.2
Stress at proportionalit			Side (•	Shear paral	et to grain	MPa T	• •	nce to splittiing N/cm Plane T-plane
11.5	9.95	1	7580	6898	8990 8′	81	13	.1 13.6		1	

TRADE NAME: Penyau BOTANICAL NAME: Upuna borneensis Sy (Dipterocarpaceae)

LOCAL NAME: Upun batu(Kal.); Upun(Sab.); Balau penjau(In.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: yellow, brown, - Odour: indistinct,

- Grain: straight to fairly interlocked. - Texture: medium. - Weight: yery heavy. - Shrankage: small.

STRENGTH CLASSES: very strong,
SEASONING - Air drying rates: moderately fast. - Checking: - Deformation:

NATURE DUARBILITY: durable. AMENABILITY TO PRESERVATIVE TREATMENT: low. WORKING QUALITIES: difficult.

USES: House building, Durable timber, Furniture,

Bedding wood material.

GEOGRAPHIC DISTRIBUTION: Brunei, Malaysia, Indonesia.

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Vessel grouping: exclusively solitary, Perforation plates: simple, Intervessel pits: extremely rare or absent, vestured pits present,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered. - Mean length: - Wall thickness: yery thick.

TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: vasicentric,

RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, - Sheath cells present,

MISCELLANEOUS:

Axial intercellular canals in diffuse,

Locality of growth	Moisture Dens content % Basic density				
Malaysia	15	1.14	156 162.5	17.8 17.28	87.0 94.6
	Hardness N. Side grain end grain				ce to splittiing N/cm lane T-plane
		18	.0 20.5	1	

TRADE NAME: Ebony BOTANICAL NAME: Diospyros celebica Bakh (Ebenaceae)
LOCAL NAME: Macassar ebony (USA.); Amara, Ayu maitong, Kayu itam, Maeta, Sora, Toetandu (In.)

HABIT OF TREE: medium tree, large tree,
PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: black, with streaks, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: fine, - Weight: very heavy, - Shrankage: very large,

SEASONING - Air drying rates: slow. - Checking: slight risk of checking. - Deformation:

NATURE DUARBILITY: durable. AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately difficult,

USES: Furniture, Veneer, Musical instruments,

1.15. 1

Turnery wood, Carvinge, Novelties,

GEOGRAPHIC DISTRIBUTION: Indonesia,

GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sg.mm. Vessel element mean length: 350-800um, Gums and other deposits.

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick, very thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, - Banded: 1-3 cells, RAYS - Width: exclusively uniseriate, - Numbers: >12/mm, - Ray tissues: heterogeneous uniseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells,

- · · · · · · · · · · · · · · · · · · ·	trees Moisture Densi ted content % Basic density		•	Modulus of Maximum crushingst elasticity GPa MPa	rength
Indones i a	15	1.09	110.7 115.3	14.71 14.28 60.2 65.4	4
	Hardness N. Side grain end grain	•		Resistance to splittiing R-Plane T-plane	N/cm
				1	

TRADE NAME: Jenitri BOTANICAL NAME: Elaeocarpus sphaericus K. schum. (Elaeocarpaceae) LOCAL NAME: Sengkurat (M.); Sanga burong (P. M.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow. brown. - Odour: indistinct. - Grain: straight. - Texture: fine, - Weight: light, - Shrankage: very small, STRENGTH CLASSES: weak. SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation, NATURE DUARBILITY: non-durable, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: easy, USES: Interior finish, Veneer, Plywood, Packing boxes, Matches, GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia, Papua New Guinea, India, Sri Lanka, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple, - Intervessel pits: alternate, - Vessel-ray pitting: large, rounded, - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: terminal. - Paratracheal p.: scanty. RAYS - interconnected (fused) rays. - Width: commonly 4-10 seriate. - Numbers: >12/mm. - Ray tissues: heterogeneous type I, heterogeneous type II,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells. - crystalliferous cells: ordinary, chambered.

Locality of growth				Bending strength ty MPa		Maximum crushingstrength MPa
Malaysia] 1	17.3 0	.43 0.515	61 76	10.3 9.6	34.1 41.3
	imit MPa	Hardness N. Side grain end	•	ralel to grain MPa	•	ce to splittiing. N/cm lane T-plane
,		2670 2854		7.2 8.8	35	48 .

TRADE NAME: Kemiri BOTANICAL NAME: Aleurites moluccana Willd. (Euphorbiaceae) LOCAL NAME: Lumbang, Candlenut tree (Ph.): Berace (In.) HABIT OF TREE: large tree, PHYSICAL PROPERTIES - Heartwood and Sabwood: indistinct. - Heartwood Color: white to grey, yellow. - Odour: indistinct. - Grain: straight. - Texture: fine. - Weight: very light. - Shrankage: STRENGTH CLASSES: very weak. SEASONING - Air drying rates: - Checking: no risk of checking. - Deformation: no risk of deformation. NATURE DUARBILITY: non-durable. WORKING QUALITIES: easy. USES: Interior finish. Sporting goods. Food containers, Wood mould, Household appliance, Battery separators, Pulpwood, GEOGRAPHIC DISTRIBUTION: Philippines, Indonesia, China. GROWTH RINGS: moderately distinct, indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern, in diffuse... - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: large, rounded. - Mean T.D.: 100-200um. - Vessel No.: <5/sq.mm, - Vessel element mean length: >800um, - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: yery thin. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, terminal, - Paratracheal p.: scanty, - Banded: 1-3 cells. RAYS - interconnected (fused) rays, - Width: 1-3 cells, - multiseriate portion(s) as wide as uniseriate, - Numbers: 4-12/mm. - Ray tissues: heterogeneous type I, heterogeneous type II, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary,

10.00

Locality of growt					Modulus of Maximum crushingstrength elasticity GPa MPa
Philippines	1	green 0.29	0.347	22.1 45	4.12 5.9 9.67 24.4
		Kardness N. Side grain ∣ end grain		l to grain MPa	Resistance to splittiing N/cm R-Plane T-plane
1.45	0.63	1200 . 1420	3.66	6.6	1

TRADE NAME: Tuai BOTANICAL NAME: Bischofia javanica Bl. (Euphorbiaceae)

LOCAL NAME: Godog (In.); Gintungan (Java); Nhoi (Viet); Term (Th.); Bisshopwood (Ind. Bur.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: red, purple, with streaks, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: fine, - Weight: moderately heavy, - Shrankage: large, very large,

STRENGTH CLASSES: medium.

SEASONING - Air drying rates: - Checking: slight risk of checking, - Deformation: slight risk of deformation.

NATURE DUARBILITY: moderately durable, RESISTANCE TO TERMITES: no, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately easy,

USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Furniture,

Packing boxes.

GEOGRAPHIC DISTRIBUTION: Vietnam, Thailand, Malaysia, Philippines, Indonesia, China, Bangladesh, India,

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse.

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like. Mean T.D.: 100-200um.
- Vessel No.: 5-20/sq.mm, Vessel element mean length: >800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Septate fibres: present, - Mean length: >1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - absent or extremely rare.

RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type I, heterogeneous type II, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth	No.of trees tested	Moisture content % B	Densit asic density	ty g/cm3 Air-dry density	Bending strength MPa	Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines	1	12	0.56	0.728	111 102	11.3 10.5	49.2 45.5
	•			Shear paral R	el to grain MPa	•	ce to splittiing N/cm lane T-plane
. 9.80 8	.48	8180 7444	10600 9646	6 - 16.	6 17.2	1	

TRADE NAME: Sesendok BOTANICAL NAME: Endospermum diadenum (Mig.) Airy-Shaw. (Euphorbiaceae) LOCAL NAME: Sendok-sendok (Sab. Br. M.): Ekur belangkas, Terbulan (Sar.): Membulan (P. M.): Merbulan, Lempaung: Labu (In.) HABIT OF TREE: large tree, PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: vellow. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: medium. - Weight: light. - Shrankage: very small: STRENGTH CLASSES: weak. SEASONING - Air drying rates: fast. - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: non-durable. RESISTANCE TO TERMITES: no. AMENABILITY TO PRESERVATIVE TREATMENT: good. WORKING QUALITIES: easy. USES: Furniture, Plywood, Packing boxes, Wood mould, Household appliance, Matches, Disposable chopsticks etc., GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia, GROWTH RINGS: moderately distinct. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern. - Vessel grouping: radial multiple. - Perforation plates: simple. - Intervessel pits: alternate, - Vessel-ray pitting: large, rounded, - Mean T.D.: >200, - Vessel No.: <5/sq.mm, - Vessel element mean length: >800um, - Tyloses: present, FIRRES AND FIRRE TRACHEIDS - Pits: moderately distinct bordered. - Mean length: 900-1600um. - Wall thickness: very thin. AXIAL PARENCHYMA - Banded: 1-3 cells. RAYS - interconnected (fused) rays. - Width: 1-3 cells. - multiseriate portion(s) as wide as uniseriate. - Numbers: 4-12/mm. - Ray tissues: heterogeneous type I, heterogeneous type II, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: ordinary,

Locality of growth						Modulus of	Maximum crushingstrength MPa
Malaysia	1 1	76	0.33	0.400	39 .53	8.5 7.0	20.8 28.9
	•	Hardı Side grain		•	el to grain MPa	•	nce to splittiing N/cm lane T-plane
1.75	1.5	1560		5.4	7.5	32	32

TRADE NAME: Rubberwood · BOTANICAL NAME: Hevea brasiliensis Muell.-Arg (Euphorbiaceae)
LOCAL NAME: Getah(Sab.): Kayu getah(M.): Para rubber(Ph., M.): Karet(In.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: yellow, brown, - Odour: indistinct,

- Grain: straight, oblique. - Texture: fine, medium. - Weight: moderately heavy. - Shrankage: very small,

STRENGTH CLASSES: weak.

SEASONING - Air drying rates: moderately fast, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable, AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: easy.

USES: Interior finish, Furniture,

Packing boxes, Household appliance, Turnery wood, Carvinge, Pulpwood,

GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, China,

GROWIH RINGS: moderately distinct, indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern.

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm. Vessel element mean length: 350-800um. Tyloses: present.

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse-in-aggregates, - Paratracheal p.: scanty, vasicentric, - Banded: 1-3 cells,

RAYS - interconnected (fused) rays, - Width: 1-3 cells, commonly 4-10 seriate, - multiseriate portion(s) as wide as uniseriate, - Numbers: 4-12/mm,

- Ray tissues: heterogeneous type I, heterogeneous type II,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in vessels,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth	•	•			Bending strength MPa	•	Maximum crushingstrength MPa
Malaysia	3	17.2	0.53	0.640	66 75	9.2 9.2	32.3 39.0
Stress at l proportionality	imit MPa			Shear paral R	el to grain MPa		ce to splittiing N/cm lane T-plane
4.69 5	.15	4320 4605		11.	0 13.3	54	72

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TRADE NAME: Saninten BOTANICAL NAME: Castanopsis argentea A.Dc. (Fagaceae)

LOCAL NAME: Berangan, tunggeureuk(In.)

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HABIT OF TREE: medium tree, large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: yellow, brown, - Odour: indistinct.

- Grain: straight. - Texture: medium. - Weight: moderately heavy. - Shrankage: yery large.

STRENGTH CLASSES: medium.

SEASONING - Air drying rates: - Checking: - Deformation:

NATURE DUARBILITY: durable, AMENABILITY TO PRESERVATIVE TREATMENT: medium, WORKING QUALITIES: moderately easy,

USES: House building, Interior finish, Durable timber,

Agricultural implement wood, Packing boxes, Tool handle, Fuel,

GEOGRAPHIC DISTRIBUTION: Indonesia,

GROWTH RINGS: moderately distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern,

- Vessel grouping: exclusively solitary, Perforation plates: simple, Intervessel pits: extremely rare or absent.
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: >200,
- Vessel No.: <5/sq.mm. Vessel element mean length: 350-800um. Tyloses: present.

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick,

TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, - Banded: 1-3 cells,

RAYS - Width: exclusively uniseriate, - Numbers: 4-12/mm, >12/mm, - Ray tissues: homogeneous uniseriate.

Locality of growth		•	Densit Basic density							us of ity GPa	•	crush MP	ingstrength a
Indonesia		14.2			0.860		95.9	96.4	11.86	11.4	53.4	/	55.7
Stress at lin				•		paral	to gra	in MPa T			ce to spl		
				1	7.2	8.0	8.	0 8.9	l				

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TRADE NAME: Manaring
                       BOTANICAL NAME: Lithocarpus soleriana Rehd. (Fagaceae)
LOCAL NAME: Ulian, masaring, Ihip, bayukan(Ph.)
HABIT OF TREE: medium tree, large tree.
PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown, red. - Odour: indistinct.
                - Grain: straight to fairly interlocked, - Texture: coarse, - Weight: heavy, - Shrankage:
STRENGTH CLASSES: strong.
SEASONING - Air drying rates: - Checking: - Deformation:
NATURE DUARBILITY: moderately durable. WORKING QUALITIES: moderately difficult.
USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Furniture.
GEOGRAPHIC DISTRIBUTION: Philippines.
GROWIN RINGS: indistinct or absent.
VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern.
             - Vessel grouping: exclusively solitary. - Perforation plates: simple. - Intervessel pits: extremely rare or absent.
             - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: >200,
             - Vessel No.: <5/sq.mm. - Vessel element mean length: >800um. - Tyloses: present.
FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: >1600um, - Wall thickness: very thick,
TRACHEIDS: vasicentric. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, - Banded: 1-3 cells,
RAYS - aggregate rays common... - Width: commonly 4-10 seriate, - Numbers: 4-12/mm,
     - Ray tissues: homogeneous uniseriate and multiseriate, heterogeneous type III,
MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells. - crystalliferous cells: chambered,
                                         TABLE OF PHYSICAL AND MECHANICAL PROPERTIES
 Locality of growth | No. of trees | Moisture |
                                                 Density g/cm3
                                                                      | Bending strength | Modulus of | Maximum crushingstrength
                      tested | content % | Basic density | Air-dry density |
        Stress at limit
                                   Hardness N.
                                                       Shear paralel to grain MPa
                                                                                             Resistance to splittiing N/cm
    proportionality MPa | Side grain | end grain | R
                                                                                  T
                                                                                                    R-Plane | T-plane
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TRADE NAME: Bintangor BOTANICAL NAME: Calophyllum inophyllum L. (Guttiferae)

LOCAL NAME: Bintangor laut (M.) Bintanghol, Bitaog (Ph.); Mu-u (Viet.); Njamplung In.); Pongnget (Bur.); Poon (Bur. Ind.); Tanghon, kathing (Th.)

HABIT OF TREE: large tree,

Contract of the

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: red, - Odour: indistinct,

- Grain: interlocked, - Texture: medium, - Weight: moderately heavy, - Shrankage: large,

STRENGTH CLASSES: medium,

SEASONING - Air drying rates: moderately fast, - Checking: slight risk of checking; - Deformation: slight risk of deformation,

NATURE DUARBILITY: moderately durable, RESISTANCE TO TERMITES: no, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately easy,

USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Furniture, Veneer, Plywood, Wood based panel, Sporting goods, Musical instruments,

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Agricultural implement wood, Packing boxes, Gunstocks, Bent wood,

GEOGRAPHIC DISTRIBUTION: Vietnam, Burma, Malaysia, Philippines, Indonesia, Papua New Guinea, China, India, Fiji,

GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern,

- Vessel grouping: exclusively solitary, Perforation plates: simple, Intervessel pits: extremely rare or absent,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: 350-800um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: present, - Mean length: 900-1600um, - Wall thickness: thin to thick, TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Banded: 1-3 cells,

RAYS - Width: exclusively uniseriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous uniseriate, heterogeneous type II, heterogeneous type III, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered.

Locality of growth	•	•	•		Bending strength MPa	•	Maximum crushingstrength MPa
Philippines	1	12	0.56	0.671	106 97.2	8.56 7.94	38.8 35.9
Stress at proportionalit	limit y MPa		ness N. end grain	Shear paral R	el to grain MPa	<u>.</u>	ce to splittiing N/cm lane T-plane
12.1	10.5	6470 5888	7890 718	0 15.	0 15.5	1	

TRADE NAME: Geronggang BOTANICAL NAME: Cratoxylum arborescens Bl. (Guttiferae) LOCAL NAME: Serugan (Sab.): Geronggang (M. In. Sab.): Adat (In.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: red. - Odour: indistinct. - Grain: straight. - Texture: very fine. - Weight: light, - Shrankage: comparatively large, STRENGTH CLASSES: weak. SEASONING - Air drying rates: fast. - Checking: slight risk of checking. - Deformation: no risk of deformation. NATURE DUARBILITY: non-durable RESISTANCE TO TERMITES: no. AMENABILITY TO PRESERVATIVE TREATMENT: medium. WORKING QUALITIES: moderately easy. USES: House building, Interior finish, Veneer, Plywood, Wood based panel, Culture, Packing boxes. Food containers. Pulpwood. GEOGRAPHIC DISTRIBUTION: Vietnam, Thailand, Malaysia, Philippines, Indonesia, Papua New Guinea, Fiji, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: 5-20/sg.mm. - Vessel element mean length: 350-800um. - Tyloses: present. Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: very thin. TRACHEIDS: vasicentric, AXIAL PARENCHYMA. - Aportracheal p.: diffuse, - Paratracheal p.: scanty, vasicentric, RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III, MINERAL INCLUSIONS - Silica: present in ray cells, present In axial parenchma cells.

Locality of growth	•	es Moisture Densit content % Basic density	• -	•	•	Maximum crushingstrength MPa
Malaysia	5	106 0.37	0.450	40 61	8.0 8.1	18.3 33.4
Stress at l proportionality		Hardness N. Side grain ∣ end grain	•	el to grain MPa		nce to splittiing N/cm lane T-plane
1.93 2	.3	1870	5.1	8.4	32	40

TRADE NAME: Trai-ly BOTANICAL NAME: Garcinia fragraeoides A. Chev. (Guttiferae) LOCAL NAME: HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: yellow. - Odour: indistinct. - Grain: straight, oblique, - Texture: fine, - Weight: very heavy, - Shrankage: STRENGTH CLASSES: strong. SEASONING - Air drying rates: very slow, - Checking: - Deformation: NATURE DUARBILITY: very duarble. WORKING QUALITIES: difficult. USES: House building, Durable timber, Ship and boat manufacturing, Furniture, Musical instruments, Novelties, Bedding wood material, GEOGRAPHIC DISTRIBUTION: Vietnam. Cambodia. GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, - Vessel grouping: exclusively solitary, radial multiple. - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 50-100um, - Vessel No.: 20-40/sg.mm. - Vessel element mean length: 350-800um, Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: 900-1600um. - Wall thickness: very thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: aliform, confluent, - Banded: 1-3 cells, >3 cells, RAYS - interconnected (fused) rays, - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: chambered. - Silica: present in ray cells. TABLE OF PHYSICAL AND MECHANICAL PROPERTIES Bending strength | Modulus of | Maximum crushingstrength Locality of growth | No. of trees | Moisture | Density g/cm3 tested | content % | Basic density | Air-dry density | | elasticity GPa | Shear paralel to grain MPa Resistance to splitting N/cm Stress at limit . Hardness N. Side grain | end grain proportionality MPa R-Plane | T-plane

TRADE NAME: Penaga BOTANICAL NAME: Mesua ferrea L. (Guttiferae)

LOCAL NAME: Bosneak (Cam.): Boonnark, Bunnark (Th.): Vap (Viet.): Lenggapus (P.M.): Mergasing (Sar.): Nagasari (In.): Mesua (Ind.)

HABIT OF TREE: medium tree, large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: red, with streaks, - Odour: indistinct,

- Grain: interlocked. - Texture: fine. - Weight: heavy, yery heavy. - Shrankage: comparatively large.

STRENGTH CLASSES: very strong.

SEASONING - Air drying rates: slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation.

NATURE DUARBILITY: moderately durable, RESISTANCE TO TERMITES: no, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: difficult,

USES: House building, Durable timber, Ship and boat manufacturing, Furniture,

Tool handle, Bedding wood material,

GEOGRAPHIC DISTRIBUTION: Vietnam, Laos, Cambodia, Thailand, Malaysia, Indonesia, China, India.

GROWIH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern,

- Vessel grouping: exclusively solitary, Perforation plates: simple, Intervessel pits: extremely rare or absent,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um, .
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: 350-800um, Tyloses: present, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: 900-1600um, - Wall thickness: very thick,

TRACHEIDS: vasicentric. AXIAL PARENCHYMA - Banded: 1-3 cells. >3 cells.

RAYS - Width: exclusively uniseriate, - Numbers: >12/mm, - Ray tissues: heterogeneous uniseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered.

Locality of growth	•	s Moisture content % Bas				-	Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia	3	16.5	0.97	1.120	155	171	19.5 19.3	79.5 92.9
Stress at l proportionality		Hard∩ess Side grain		Shear paral R	el to grain	MPa T	•	ce to splittiing N/cm lane T-plane
16.07 1	7.15	14860 15529	* * * * * * * * * * * * * * * * * * * *	19.	3 23.0		63	75

BOTANICAL NAME: Altingia excelsa Noronha (Hamamelidaceae) TRADE NAME: Rasamala LOCAL NAME: Nantayok (Bur.): Jutili (Ind.): Sob (Th.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, indistinct, - Heartwood Color: brown, red. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: fine. - Weight: heavy. - Shrankage: large, STRENGTH CLASSES: strong. SEASONING - Air drying rates: slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: moderately durable. WORKING QUALITIES: moderately difficult. USFS: House building, Durable timber, Ship and boat manufacturing, Vehicle. Pulpwood. GEOGRAPHIC DISTRIBUTION: Burma, Thailand, Malaysia, Indonesia, China, India, GROWTH RINGS: moderately distinct, indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, . - Arrangement: in diagonal and/or radial pattern, in diffuse, - Vessel grouping: exclusively solitary, solitary vessel outline angular, - Perforation plates: scalariform, - Intervessel pits: extremely rare or absent, - Vessel-ray pitting: large, rounded, large, gash-like, - Vessel with helical thickenings, - Mean T.D.: 50-100um, - Vessel No.: 40-100/sq.mm, - Vessel element mean length: >800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Fibres with helical thickening, - Mean length: >1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, RAYS - interconnected (fused) rays. - Width: 1-3 cells. - Numbers: 4-12/mm. - Ray tissues: heterogeneous type II, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary,

Locality of growth No.of trees	: Moisture Densit content % Basic density			
		 1 .	1	
	Hardness N. Side grain end grain			ce to splittiing N/cm lane T-plane
1				

TRADE NAME: Buah keras Laut BOTANICAL NAME: Hernandia nymphaefolia Kunitz. (Hernandiaceae) LOCAL NAME: Baru Laut (P. M.) HABIT OF TREE: small tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: white to grey, - Odour: indistinct, - Grain: straight, - Texture: fine, - Weight: light, - Shrankage: small, STRENGTH CLASSES: weak. SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: non-durable. WORKING QUALITIES: easy. USES: Furniture, Culture, Household appliance, Buoys, Disposable chopsticks etc.. GEOGRAPHIC DISTRIBUTION: Malaysia. GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse. - Perforation plates: simple, - Intervessel pits: alternate. - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm. - Vessel element mean length: 350-800um. FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: 900-1600um, - Wall thickness: very thin, AXIAL PARENCHYMA - Paratracheal p.: aliform, confluent, - Banded: 1-3 cells, >3 cells, RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate and multiseriate.

ocality of growth	No.of trees tested	Moisture content % Ba	Densit sic density	y g/cm3 Air-dry density	Bending strength MPa	Modulus of elasticity GPa	Maximum crushingstrength
					el to grain MPa		ce to splittiing N/cm lane T-plane

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TRADE NAME: Dedaru
                       BOTANICAL NAME: Cantleva corniculata Howord (Icacinaceae)
LOCAL NAME: Bedaru (Sar. In.); Samala (Sab.); Seranai (In.)
HABIT OF TREE: large tree.
PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: yellow. - Odour: distinct.
                    - Grain: interlocked. - Texture: fine, - Weight: heavy, - Shrankage:
STRENGTH CLASSES: very strong, strong,
SEASONING - Air drying rates: moderately slow, - Checking: - Deformation:
                             WORKING QUALITIES: moderately easy,
NATURE DUARBILITY: durable.
USES: House building, Durable timber, Vehicle,
      Tool handle, Bedding wood material,
GEOGRAPHIC DISTRIBUTION: Malaysia.
GROWTH RINGS: indistinct or absent,
VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse.
               - Vessel grouping: exclusively solitary. - Perforation plates: simple. - Intervessel pits: extremely rare or absent,
               - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um,
               - Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: >800um, - Tyloses: present,
FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: very thick,
AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: scanty, aliform,
RAYS' - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm,
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- Ray tissues: heterogeneous type II,

Locality of growth				y g/cm3 Air-dry density				Maximum crushingstrength MPa
Malaysia	1	16.7	0.80	0.930	128 143		18.3 18.3	62.8 74.0
Stress at proportionality	limit y MPa		ness N. end grain	Shear paral R	el to grain MPa		•	ce to splittiing N/cm lane T-plane
		10280 10804		13.	1 15.7		53	72

BOTANICAL NAME: Irvingia malayana Oliv. ex Benn. (Irvingiaceae) TRADE NAME: Kabok LOCAL NAME: Paul kijang (M.): Rongin, Paul kidiang (In.): Kaju tulang (Br.): Cay Chambak(Cam.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, . - Heartwood Color: brown, with streaks, - Odour: indistinct, - Grain: straight to fairly interlocked. - Texture: fine. - Weight: yery heavy. - Shrankage: comparatively large, STRENGTH CLASSES: strong. SEASONING - Air drying rates: slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation, NATURE DUARBILITY: non-durable. AMENABILITY TO PRESERVATIVE TREATMENT: good. WORKING QUALITIES: difficult. USES: House building, Interior finish, Durable timber, Furniture, GEOGRAPHIC DISTRIBUTION: Vietnam, Laos, Cambodia, Burma, Thailand, Malaysia, Indonesia, India, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: >1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Banded: 1-3 cells, >3 cells, RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III. MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered, - Silica: present in ray cells,

Locality of growt	•	Moisture Densi content % Basic density	ty g/cm3 Bendin Air-dry density	•	•	mum crushingstrength MPa
Malaysia] 3	16.8 0.83	1.090	ĺ	70	0.5 83.5
		Hardness N. Side grain end grain	Shear paralel to gr	ain MPa ,T	•	splittiing N/cm T-plane
12.62	13.64 1	13130 13839	17.0 2	20.3		

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BOTANICAL NAME: Fingelhardtia roxburghiana Wall. (Juglandaceae) TRADE NAME: Kavuhujan LOCAL NAME: Cheo, Cheo Tia (Viet.); Dungun paya, Paar, Teraling (M.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown. - Odour: indistinct. - Grain: straight. oblique. - Texture: fine. - Weight: moderately heavy. - Shrankage: small. STRENGTH CLASSES: medium, SEASONING - Air drying rates: moderately fast. - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: moderately durable. WORKING QUALITIES: moderately easy. USES: House building, Durable timber, Vehicle, Furniture, Plywood, Agricultural implement wood. Wood mould, Turnery wood, Gunstocks. GEOGRAPHIC DISTRIBUTION: Vietnam, Burma, Thailand, Malaysia, Indonesia, China, GROWIH RINGS: moderately distinct. VESSELS/PORES - Porosity: wood semi-ring-porous, wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern. - Perforation plates: simple, scalariform, - Intervessel pits: alternate, - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sg.mm. - Vessel element mean length: >800um. - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, vasicentric, - Banded: 1-3 cells, RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II,

Locality of growth	No.of trees tested	Moisture content % Ba	Densit asic density	y g/cm3 Air-dry density	Bending streng MPa	th Modulus of elasticity GPa	Maximum crushingstrength MPa
China	Ļ	1	0.46	0.57	91.1	10.10	44.2
Stress at l proportionality	•			Shear paral	el to grain MP		nce to splittiing N/cm Plane T-plane
	1			9.1	9.8	1	

TRADE NAME: Medang BOTANICAL NAME: Alseodaphne insignis Gamb. (Lauraceae)

LOCAL NAME: Mecang tanah (P. M.); Medang payong (M.)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: brown, - Odour: indistinct,

- Grain: straight, oblique, - Texture: fine, - Weight: moderately heavy, - Shrankage: small,

STRENGTH CLASSES: weak.

SEASONING - Air drying rates: slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: AMENABILITY TO PRESERVATIVE TREATMENT: Low. WORKING QUALITIES: moderately easy.

USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Furniture, Veneer, Plywood,

Agricultural implement wood,

GEOGRAPHIC DISTRIBUTION: Malaysia.

GROWIN RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse.

- Perforation plates: simple, scalariform, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- . Vessel No.: 5-20/sq.mm, Vessel element mean length: >800um, Tyloses: present,

· FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Septate fibres: common, - Mean length: >1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Paratracheal p.: scanty, vasicentric, aliform,

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III,

MISCELLANEOUS: Oil and/or mucilage cells associated with ray parenchyma, Oil and/or mucilage cells associated with axial parenchyma,

Locality of growth	•	•		y g/cm³ Air-dry density		· Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia	3	45	0.57	0.705		 	39.9 55.9
Stress at l proportionality	imit	Hardne Side grain		Shear paral	el to grain MPa	· ·	ce to splittiing N/cm lane T-plane
4.00	5.4	3340 5721		8.3	12.8	1	

Northead . . .

BOTANICAL NAME: Cinnaponum porrectum Kostern (Lauraceae) TRADE NAME: Medang LOCAL NAME: Medang Lesah (In.): Medang (In. M.); Medang kemangi (M.) Medang rawali (Bor.); Keplan wangi (Sar.): Ki-serah (Bur. In.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: red. - Odour: distinct. - Grain: interlocked, - Texture: fine, - Weight: light, moderately heavy, - Shrankage: very small, STRENGTH CLASSES: strong, medium. SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: no risk of deformation, NATURE DUARBILITY: durable. WORKING QUALITIES: easy. USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Furniture, Veneer, Plywood, Wood mould. GEOGRAPHIC DISTRIBUTION: Burma, Malaysia, Indonesia, China, Parkistan, India, GROWIN RINGS: moderately distinct, indistinct or absent, VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern, in diffuse. - Perforation plates: simple, scalariform, - Intervessel pits: alternate, - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sg.mm. - Vessel element mean length: 350-800um. - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: 900-1600um. - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: scanty, vasicentric, aliform, confluent, RAYS - interconnected (fused) rays. - Width: 1-3 cells. - Numbers: 4-12/mm. - Ray tissues: heterogeneous type II, heterogeneous type III,

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TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

MISCELLANEOUS: Oil and/or mucilage cells associated with ray parenchyma, Oil and/or mucilage cells associated with axial parenchyma.

Locality of growth		Moisture content % Basic								
Indonesia	· · · · · · · · · · · · · · · · · · ·	1 1		0.63		55.2	57.5	8.333 8	.090 56.6	61.5
		Hardness Side grain e								
]	6.4	7.0	7.3	7.9			

TRADE NAME: Medang BOTANICAL NAME: Cryptocarva griffithii Wight, (Lauraceae) LOCAL NAME: Medang dering (Sab.): Medang (M. Br. In.): Medang Dayong (M.) HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: brown, - Odour: indistinct. - Grain: straight. - Texture: fine. - Weight: moderately heavy. - Shrankage: STRENGTH CLASSES: medium. SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: WORKING QUALITIES: easy. USES: House building, Interior finish, Furniture, Veneer, Plywood, Agricultural implement wood. GEOGRAPHIC DISTRIBUTION: Brunei, Malaysia, Indonesia. GROWIN RINGS: moderately distinct. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sg.mm. - Vessel element mean length: 350-800um. Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: terminal. - Paratracheal p.: scanty. RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, - Tile cells: Pterospermum type, MISCELLANEOUS: Oil and/or mucilage cells associated with ray parenchyma. Oil and/or mucilage cells associated with axial parenchyma.

ocality of growth No.of tree tested	s Moisture Dens content % Basic density		•	•	•
·	1				1
	Hardness N. Side grain end grain				ce to splittiing N/cm lane T-plane
1		l		1	

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TRADE NAME: Medang
                     BOTANICAL NAME: Dehaasia cuneata Bl. (Lauraceae)
LOCAL NAME: Medang tanèhan (In.): Medang payong (M.)
HABIT OF TREE: medium tree.
PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: yellow. - Odour: indistinct.
                    - Grain: oblique, - Texture: fine, - Weight: moderately heavy, - Shrankage: small,
STRENGTH CLASSES: medium.
SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation:
NATURE DUARBILITY: WORKING QUALITIES: easy.
USES: House building, Interior finish, Furniture, Veneer, Plywood.
      Turnery wood, Carvinge,
GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia,
GROWIN RINGS: moderately distinct.
VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,
               - Perforation plates: simple. - Intervessel pits: alternate.
               - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um,
               - Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present.
FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: >1600um, - Wall thickness: thin to thick.
AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: scanty,
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MISCELLANEOUS: Oil and/or mucilage cells associated with ray parenchyma, Oil and/or mucilage cells associated with axial parenchyma,

RAYS - Width: 1-3 cells. - Numbers: 4-12/mm. - Ray tissues: heterogeneous type II. heterogeneous type III.

Locality of growth	No.of trees tested	Moisture content % E	Densit Basic density	y g/cm3 Air-dry density	Bending strength MPa	Modulus of elasticity GPa	Maximum crushingstrength MPa
Stress at l				Shear paralo	el to grain MPa	<u>:</u>	ce to splittiing N/cm lane T-plane
				1			

TRADE NAME: Relian BOTANICAL NAME: Eusideroxylon zwageri Teijsm. & Binnend. (Lauraceae) LOCAL NAME: Borneo ironwood (Uk.): Tambulian (Ph.): Badiudiang, Bulian, Oelian, Onglen, Tabulin, Tihin, Ulin, Uling (In.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: red. - Odour: distinct. - Grain: straight to fairly interlocked. - Texture: fine. medium. - Weight: very heavy. - Shrankage: comparatively large. STRENGTH CLASSES: very strong. SEASONING - Air drying rates: slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: very duarble. RESISTANCE TO TERMITES: yes AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: difficult. USES: House building, Durable timber, Ship and boat manufacturing, Vehicle, Bedding wood material. GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, GROWIN RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm. - Vessel element mean length: 350-800um. - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length; >1600um, - Wall thickness: yery thick. AXIAL PARENCHYMA - Aportracheal p.: terminal. - Paratracheal p.: scanty, aliform, confluent. - Banded: 1-3 cells. >3 cells. RAYS - interconnected (fused) rays, - Width: 1-3 cells, commonly 4-10 seriate, - multiseriate portion(s) as wide as uniseriate, - Numbers: 4-12/mm. - Ray tissues: heterogeneous type III, MISCELLANEOUS: Oil and/or mucilage cells associated with axial parenchyma,

Locality of growth No.of tree:	s Moisture Densit content % Basic density				•
Indonesia	15.5	1.198	140.3 149.1	18.39 18.0	71.9 80.1
Stress at limit proportionality MPa	Hardness N. Side grain end grain	•		<u>:</u>	ce to splittiing N/cm lane T-plane
1		11.4 11.	5 13.1 13.3	3 1	

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BOTANICAL NAME: Litsea oderifera Val. (Lauraceae) TRADE NAME: Medang LOCAL NAME: Medang Perawas (In.): Lisang (Sab.): Batikuling surutan (Ph.); Lelamit, Perawas (In.) HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: brown. - Odour: indistinct. - Grain: straight. - Texture: fine. - Weight: light. moderately heavy. - Shrankage: small. STRENGTH CLASSES: medium, weak. SEASONING - Air drying rates: moderately slow. - Checking: no risk of checking. - Deformation: no risk of deformation. NATURE DUARBILITY: non-durable. WORKING QUALITIES: easy, USFS: House building, Interior finish, Furniture, Veneer, Plywood, Culture, Packing boxes, Wood mould, Carvinge, GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse. - Perforation plates: simple, scalariform, - Intervessel pits: alternate, - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: >200, - Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Septate fibres: common. - Mean length: >1600um. - Wall thickness: thin to thick. AXIAL PARENCHYMA - Paratracheal p.: scanty, vasicentric, aliform, RAYS - Width: 1-3 cells. - Numbers: <4/mm. 4-12/mm. - Ray tissues: heterogeneous type II. heterogeneous type III. MISCELLANEOUS: Oil and/or mucilage cells associated with axial parenchyma,

ocality of growth No.of trees	s Moisture Densi content % Basic density			
<u> </u>	1		1	I
•	Hardness N. Side grain end grain	•		ce to splittiing N/cm lane T-plane
.e.			 	

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TRADE NAME: Medang
                     BOTANICAL NAME: Nothaphoebe panduriformis Gamb. (Lauraceae)
LOCAL NAME: Medang pisang (M.)
HARIT OF TREE: medium tree.
PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: green, - Odour: indistinct,
                   - Grain: straight. - Texture: fine, .- Weight: light, - Shrankage: small.
STRENGTH CLASSES: weak.
SEASONING - Air drying rates: - Checking: - Deformation:
NATURE DUARBILITY: WORKING QUALITIES: easy.
USES: Interior finish, Furniture, Veneer, Plywood,
     Packing boxes.
GEOGRAPHIC DISTRIBUTION: Malaysia,
GROWTH RINGS: indistinct or absent,
VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern.
              - Perforation plates: simple, scalariform. - Intervessel pits: alternate.
              - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um,
              - Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, - Tyloses; present,
FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: 900-1600um. - Wall thickness: thin to thick.
AXIAL PARENCHYMA - Paratracheal p.: scanty, vasicentric,
RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III, heterogeneous type III,
MISCELLANEOUS: Oil and/or mucilage cells associated with ray parenchyma. Oil and/or mucilage cells associated with axial parenchyma.
                                           TABLE OF PHYSICAL AND MECHANICAL PROPERTIES
Locality of growth | No. of trees | Moisture |
                                                   Density g/cm3
                                                                         Bending strength | Modulus of | Maximum crushingstrength
                      tested | content % | Basic density | Air-dry density |
                                                                                          elasticity GPa
               ______
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Shear paralel to grain MPa

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Resistance to splittiing N/cm

R-Plane | T-plane

Hardness N.

proportionality MPa | Side grain | end grain | R

Stress at limit

TRADE NAME: Pilang BOTANICAL NAME: Acacia leucophloea Willd. (Leguminosae) LOCAL NAME: Tanaung (Bur.): Reru. Panharya (In.): Chalaep daeng (Th.) HABIT OF TREE: medium tree, large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: red, with streaks, - Odour: indistinct. - Grain: interlocked. - Texture: medium. - Weight: moderately heavy. - Shrankage: large. STRENGTH CLASSES: medium. - Checking: - Deformation: SEASONING - Air drying rates: NATURE DUARBILITY: non-durable, WORKING QUALITIES: moderately difficult. USES: House building, Vehicle, Agricultural implement wood, Turnery wood, Tool handle, Fuel, GEOGRAPHIC DISTRIBUTION: Burma, Indonesia, India, GROWTH RINGS: moderately distinct. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: >200. - Vessel No.: <5/sq.mm. - Vessel element mean length: <350um. Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: >1600um. - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: aliform, confluent, RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: homogeneous multiseriate, homogeneous uniseriate and multiseriate. MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

Locality of growth No. of tree	es Moisture Dens content % Basic density			•	·
Indonés i a	14.2	0.871	85.1 85.8	10.78 10.34	51.5 53.7
Stress at limit proportionality MPa	Hardness N. Side grain end grain		el to grain MPa T		ce to splittiing N/cm lane T-plane
1		7.9 9.	8.8 10.	3	

TRADE NAME: Makharmong BOTANICAL NAME: Afzelia xylocarpa Craib (Leguminosae) LOCAL NAME: Makha hua kham, Makha luang, Marka-mong (Th.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: red. with streaks, - Odour: indistinct, - Grain: straight to fairly interlocked, - Texture: medium, - Weight: heavy, - Shrankage: STRENGTH CLASSES: strong. SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: durable. WORKING QUALITIES: moderately difficult. USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, Agricultural implement wood. Tool handle, Bent wood. GEOGRAPHIC DISTRIBUTION: Burma, Thailand, GROWTH RINGS: moderately distinct, VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: terminal. - Paratracheal p.: aliform. confluent. RAYS - Width: 1-3 cells. - Numbers: 4-12/mm. - Ray tissues: homogeneous uniseriate and multiseriate. MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

Locality of growth No.of trees	Moisture Densit	y g/cm3			
tested	content % Basic density	Air-dry density	МРа	elasticity GPa	MPa
1	1		l		1
Stress at limit proportionality MPa				•	ce to splittiing N/cm lane T-plane

TRADE NAME: OBatai BOTANICAL NAME: Albizia falcataria Fosberg (Leguminosae)
LOCAL NAME: Sengon, sengon laut (In.); Moluccan sau (Ph.); Sengon Batai (In. M.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: brown, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: medium, - Weight: light, - Shrankage: small,

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STRENGTH CLASSES: very weak,

SEASONING - Air drying rates: fast, - Checking: no risk of checking, - Deformation: no risk of deformation,

NATURE DUARBILITY: non-durable. AMENABILITY TO PRESERVATIVE TREATMENT: low. WORKING QUALITIES: easy.

USES: Interior finish, Plywood, Wood based panel,

Packing boxes, Turnery wood, Matches, Pulpwood,

GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, China,

GROWTH RINGS: moderately distinct, indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, Vessel element mean length: 350-800um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: very thin,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: vasicentric,

RAYS - Width: exclusively uniseriate, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate, homogeneous uniseriate and multiseriate,
MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells. - crystalliferous cells: chambered.

Locality of growth	•	•		y g/cm3 Air-dry density	•		-			trength
Malaysia	3	72	0.32	0.385	38	51	6.8	6.8	19.2 27.	7
				Shear paral			. 1		ce to splittiing lane T-plane	N/cm
1.68 1	.2	2360		5.0	7.3			13	. 29	

TRADE NAME: White siris BOTANICAL NAME: Albizia procera Benth. (Leguminosae) LOCAL NAME: Akle (Ph.): Sitpen. Sibok (Bur.); Sada (Pak.); Then. Pluk (Th.); Akleng parang (Ph.); Wangkol, Weru, Saoentiri (In.); Safed siris (Ind. Pak.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: black, with streaks. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: medium. - Weight: moderately heavy. - Shrankage: small. STRENGTH CLASSES: medium. SEASONING - Air drying rates: - Checking: no risk of checking. - Deformation: no risk of deformation. NATURE DUARBILITY: very duarble. AMENABILITY TO PRESERVATIVE TREATMENT: low. WORKING QUALITIES: moderately difficult. USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, Plywood, Agricultural implement wood. GEOGRAPHIC DISTRIBUTION: Vietnam, Laos, Burma, Malaysia, Philippines, China, Parkistan, Bangladesh, GROWTH RINGS: moderately distinct, indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: >200. - 'Vessel No.: <5/sq.mm, - Vessel element mean length: <350um, Gums and other deposits, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: vasicentric, aliform, confluent, RAYS - Width: commonly 4-10 seriate. - Numbers: 4-12/mm. - Ray tissues: homogeneous uniseriate and multiseriate. MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered, idioblast,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

	•	*	•		Bending strength MPa		Maximum crushingstrength
;China	1	15	0.57	0.68	103.0	10.49	54.7
Stress at proportionalit	y MPa			Shear paral R	el to grain MPa	•	ce to splittiing N/cm lane T-plane
i <mark>náros en </mark>		,		10.	5 12.1		
oative							

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BOTANICAL NAME: Cassia siamea Lam. (Leguminosae) TRADE NAME: Johan LOCAL NAME: Djohar (In.) Jahar (M.) Muong, Muong den, Perdrik wood (Viet.); Angkanh (Cam.) Mezali (Bur.) Kilet. Khi lekban (Th.) Beati (Ind.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: purple, with streaks. - Odour: indistinct. - Grain; oblique, interlocked, - Texture: medium, - Weight: heavy, very heavy, - Shrankage: large. STRENGTH CLASSES: strong. SEASONING - Air drying rates: - Checking: slight risk of checking, - Deformation: slight risk of deformation, NATURE DUARBILITY: durable. RESISTANCE TO TERMITES: yes. WORKING QUALITIES: moderately difficult. USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, Agricultural implement wood, Turnery wood, Carvinge, Tool handle, Novelties, Fuel, GEOGRAPHIC DISTRIBUTION: Vietnam, Burma, Thailand, Malaysia, Indonesia, India, GROWIN RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present, - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: >200. - Vessel No.: <5/sq.mm, - Vessel element mean length: <350um, Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: 900-1600um. - Wall thickness: very thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: confluent, - Banded: >3 cells, RAYS - Width: 1-3 cells. - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate and multiseriate.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells. - crystalliferous cells: chambered.

Locality of growth		: Moisture Dens content % Basic density					
Indonesia	tested	14.8				12.06 11.67	·
Stress at proportionalit		Hardness N. Side grain ∣ end grain	•	lel to grain	MPa T	•	ce to splittiing N/cm lane I-plane
	.		9.5 10	.1 10.7	11.4	4	

TRADE NAME: Merbau kera BOTANICAL NAME: Crudia curtisii Prain (Leguminosae) LOCAL NAME: Angar-angar (Sab.): Babi kurus, jering tupai (P. M.) HABIT OF TREE: small tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: purple, with streaks. - Odour: indistinct. - Grain: interlocked, wavy. - Texture: fine. - Weight: heavy, very heavy. - Shrankage: STRENGTH CLASSES: very strong, strong, SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: non-durable, WORKING QUALITIES: difficult. USES: Interior finish. Tool handle. GEOGRAPHIC DISTRIBUTION: Malaysia. GROWTH RINGS: moderately distinct. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Vessel grouping: exclusively solitary, radial multiple, - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present, - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: <5/sq.mm. - Vessel element mean length: 350-800um. Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: >1600um. - Wall thickness: yery thick. AXIAL PARENCHYMA - Aportracheal p.: terminal, - Banded: 1-3 cells, >3 cells, RAYS - Width: 1-3 cells, - Numbers: >12/mm, - Ray tissues: homogeneous uniseriate and multiseriate, heterogeneous type !!!, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth No. of t	trees Moisture Densit ted content % Basic density	• •	, , ,	Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia	17.8	1.13	138.3 146.1	17.10 16.8	70 77.2
Stress at limit proportionality MPa	Hardness N. Side grain end grain	Shear paral R	el to grain MPa	<u>!</u>	ce to splittiing N/cm lane T-plane
	1		*************		•••••

現かり (元) (第十元 1979年 (新年本) TRADE NAME: Kekatong BOTANICAL NAME: Cynometra malaccensis Meeuwan (Leguminosae)
LOCAL NAME: Kekatong laut, belangkan,(M.P.); Katong-katong(Sab.)

HABIT OF TREE: medium tree, large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: red, purple, - Odour: indistinct,
- Grain: straight to fairly interlocked. - Texture: medium. - Weight: heavy. - Shrankage: small.

STRENGTH CLASSES: strong,

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation:

NATURE DUARBILITY: moderately durable, AMENABILITY TO PRESERVATIVE TREATMENT: medium, WORKING QUALITIES: difficult,

USES: House building, Durable timber,

Agricultural implement wood, Tool handle, Novelties,

GEOGRAPHIC DISTRIBUTION: Malaysia,
GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: >200,
- Vessel No.: <5/sq.mm, Vessel element mean length: 350-800um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, very thick, AXIAL PARENCHYMA - Paratracheal p.: aliform, confluent, - Banded: >3 cells,

ومداورة ويعمرونين

RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm,

- Ray tissues: homogeneous uniseriate and multiseriate, heterogeneous type III,
MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary.

Locality of growth	•	•			Bending strength MPa		Maximum crushingstrength MPa
Malaysia	5	18.9	0.84	1.010	135 163	18.4 18.9	67.0 87.1
Stress at I				Shear parato	el to grain MPa T		ce to splittiing N/cm lane T-plane
11.4	13.4	12370 13817		15.0	5 19.8	61	74

TRADE NAME: Payung BOTANICAL NAME: Dalbergia cochinchinensis Pierre (Leguminosae)

LOCAL NAME: Kranghung (Cam.); Siam rosewood, Trac (Viet. Cam.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: purple, with streaks, - Odour: indistinct,

- Grain: straight, - Texture: fine, - Weight: very heavy, - Shrankage: comparatively large,

STRENGTH CLASSES: very strong,

SEASONING - Air drying rates: slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARRILITY: very duarble. WORKING QUALITIES: moderately difficult.

USES: Furniture, Veneer, Musical instruments, Culture,

Carvinge, Tool handle, Novelties,

GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, Thailand,

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple. Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits. Mean T.D.: 100-200um.
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: <350um, Gums and other deposits,

 FIBRES AND FIBRE TRACHEIDS Pits: simple to minutely bordered pits, Mean length: 900-1600um, Wall thickness: very thick,

 AXIAL PARENCHYMA Aportracheal p.: diffuse, diffuse-in-aggregates, Paratracheal p.: aliform, Banded: 1-3 cells, >3 cells,

 RAYS Width: 1-3 cells, Numbers: 4-12/mm, >12/mm, Ray tissues: homogeneous uniseriate and multiseriate,

 MINERAL INCLUSIONS Crystals: Prismatic crystals present, in axial parenchyma cells, crystalliferous cells: chambered,

 MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied,

Locality of growth					Modulus of Maximum crushingstrength elasticity GPa MPa
		ļ. 12 ļ			·
proportionalit	y MPa	Hardness N. Side grain end grain	Shear paral	el to grain MPa	Resistance to splittiing N/cm R-Plane T-plane
	1		.1		l

TRADE NAME: Sonkeling BOTANICAL NAME: Dalbergia latifolia Roxb. (Leguminosae) IOCAL NAME: Angsana keling, Java-palisandre (In.): Sonobrits (Java): Bombay black wood (Ind.): Rosewood (Ind. Bur.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: yellow, purple, with streaks. - Odour: - Grain: interlocked. - Texture: fine. - Weight: heavy. - Shrankage: large. STRENGTH CLASSES: strong. SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation: slight risk of deformation. RESISTANCE TO TERMITES: moderately. AMENABILITY TO PRESERVATIVE TREATMENT: low. NATURE DUARBILITY: very duarble. WORKING QUALITIES: difficult. USES: Interior finish, Durable timber, Vehicle, Furniture, Veneer, Musical instruments, Novelties. GEOGRAPHIC DISTRIBUTION: Indonesia, India. GROWTH RINGS: moderately distinct, indistinct or absent, VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: <350um, Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse-in-aggregates, terminal, - Paratracheal p.: aliform, - Banded: 1-3 cells, RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate and multiseriate, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells. - crystalliferous cells: chambered. MISCELLANEOUS: Rays storied. Axial parenchyma storied. Vessels storied. Fibres storied.

Locality of growth No.of trees Moisture Densit				
11.8	0.75	116.1	11.28	63.2
Stress at limit Hardness N. proportionality MPa Side grain end grain	Shear parale	el to grain MPa	Resistand	ce to splittiing N/cm lane T-plane
] 14.3	3	1	

TRADE NAME: Chinachan BOTANICAL NAME: Dalbergia oliveri Gamble (Leguminosae) LOCAL NAME: Burma Tulipwood, Tamalan (Bur.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: red. - Odour: distinct, - Grain: interlocked. - Texture: fine. - Weight: very heavy. - Shrankage: STRENGTH CLASSES: strong. SEASONING - Air drying rates: slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation. RESISTANCE TO TERMITES: yes, NATURE DUARBILITY: very duarble. WORKING QUALITIES: difficult. USES: Interior finish, Vehicle, Furniture, Veneer, Sporting goods, Agricultural implement wood, Packing boxes, Turnery wood, Carvinge, Tool handle, Bent wood, Fuel, GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, Thailand, GROWTH RINGS: distinct. VESSELS/PORES - Porosity: wood semi-ring-porous, wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present, - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: <5/sq.mm, - Vessel element mean length: <350um, Gums and other deposits, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse-in-aggregates. - Paratracheal p.: confluent. - Banded: 1-3 cells. >3 cells. RAYS - Width: 1-3 cells. - Numbers: 4-12/mm. - Ray tissues: homogeneous uniseriate and multiseriate. MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells; chambered, MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied,

Locality of growth	tested	content % Ba			Bending strength MPa		Maximum crushingstrength MPa
···· Stress at l	 imit		ss N.	Shear paralo	el to grain MPa	•	ce to splittiing N/cm
				<u> </u>			

TRADE NAME: XOAV ROTANICAL NAME: Dialium cochinchinensis Pierre (Leguminosae) LOCAL NAME: Kralanh (Cam.): Khleng (Th.): Keranii (Br.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: purple. - Odour: indistinct. - Grain: interlocked. - Texture: fine. - Weight: very heavy. - Shrankage: very large. STRENGTH CLASSES: very strong. SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation: NATURE DUARBILITY: durable. RESISTANCE TO TERMITES: yes. WORKING QUALITIES: difficult. USES: House building, Durable timber, Ship and boat manufacturing, Vehicle. Agricultural implement wood. Tool handle, Oil press, Bedding wood material. GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, Thailand. Brunei. GROWTH RINGS: indistinct or absent, VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present. - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm. 5-20/sq.mm. - Vessel element mean length: <350um. Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits; - Mean length: 900-1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse-in-aggregates, - Banded: 1-3 cells. RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate and multiseriate.

100 mg 100 m

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, . - crystalliferous cells: chambered, idioblast, .

MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied,

ocality of growth	•	•			Bending strength MPa	•	Maximum crushingstrength MPa
Thailand	1.	13	·	1.10	165.9	19.41	90.7
proportionality	•			Shear paral		. •	ce to splittiing N/cm lane T-plane
· · · · · · · · · · · · · · · · · · ·				23.	0		

TRADE NAME: Keranji BOTANICAL NAME: Dialium platysepalum Baker (Leguminosae)
LOCAL NAME: Keranji kuning besar(M.): Kerandij asap(In.): Yi thong bueng(Th.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: brown, red, - Odour: indistinct, - Grain: interlocked. - Texture: medium, - Weight: heavy, very heavy. - Shrankage: small.

STRENGTH CLASSES: very strong,

SEASONING - Air drying rates: slow, - Checking: slight risk of checking, - Deformation:

NATURE DUARBILITY: durable, WORKING QUALITIES: moderately difficult,

USES: House building, Interior finish, Ship and boat manufacturing, Furniture, Veneer, Plywood,

Tool handle.

GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia,

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, Vessel element mean length: 350-800um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: present, - Mean length: 900-1600um, - Wall thickness: thin to thick, very thick, AXIAL PARENCHYMA - Paratracheal p.: scanty, - Banded: 1-3 cells, >3 cells,

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate and multiseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied,

Locality of growth No. of trees tested	content % Basic density			Modulus of elasticity GPa	
Malaysia 3	17.1 0.79	. 0.915	134 151	20.1 20.1	72.0 86.5
	Hardness N. Side grain end grain			!	ce to splittiing N/cm lane T-plane
	10640 11310	16.	.0 19.3	56	67

general design of the Mark Wall

TRADE NAME: Rarang BOTANICAL NAME: Erythrina subumbrans Merr. (Leguminosae)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: yellow, - Odour: indistinct, - Grain: straight, - Texture: medium, - Weight: very light, - Shrankage: small,

STRENGTH CLASSES: very weak,

SEASONING - Air drying rates: - Checking: - Deformation:

NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no, WORKING QUALITIES:

USES: Interior finish, Plywood,

Food containers, Battery separators, Buoys, Pulpwood,

GEOGRAPHIC DISTRIBUTION: Philippines,

GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Vessel grouping: exclusively solitary, Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: >200,
- Vessel No.: <5/sq.mm, Vessel element mean length: <350um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: very thin,

AXIAL PARENCHYMA - Banded: >3 cells,

RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, - Ray tissues: heterogeneous type II, heterogeneous type İII, - Sheath cells present, MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

the state of the s	rees Moisture Densi ed content % Basic density		•	Modulus of elasticity GPa	
Philippines	12 0.23	· 0.307	40.6 37.2	4.608 4.0.	16.3 15.1
Stress at limit proportionality MPa	!	•	el to grain MPa T		e to splittiing N/cm ane T-plane
	1 1060 965 1600 145	56 11.	0 11.4	1.	

- 90 -

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TRADE NAME: Lim BOTANICAL NAME: Erythrophloeum fordii Oliv. (Leguminosae) LOCAL NAME: Lin. Lim xank (Viet.) HABIT OF TREE: large tree PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: red. - Odour: indistinct. - Grain: interlocked - Texture: fine - Weight: heavy very heavy - Shrankage: large STRENGTH CLASSES: very strong. SEASONING - Air drying rates: - Checking: - Deformation: slight risk of deformation. NATURE DUARBILITY: very duarble. RESISTANCE TO TERMITES: ves. WORKING QUALITIES: difficult, USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, . Bedding wood material. GEOGRAPHIC DISTRIBUTION: Vietnam, China, GROWTH RINGS: moderately distinct. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 100-200um. - Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse. - Paratracheal p.: aliform. confluent. RAYS - Width: 1-3 cells. - Numbers: 4-12/mm. - Ray tissues: homogeneous uniseriate and multiseriate. MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

Locality of growth No.of trees		ty g/cm3 Bending str Air-dry density MPa		
Vietnam	12	0.950 152.1		87
		Shear paralel to grain R		nce to splittiing N/cm Plane T-plane
			l	

TRADE NAME: Merbau BOTANICAL NAME: Intsia palembanica Miq. (Leguminosae)
LOCAL NAME: Mirabow, Merbau darat, Ipil, Djumelai (In.); Salumpho (Th.); Kwila (N. G.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: red, with streaks, - Odour: indistinct, - Grain: interlocked, - Texture: medium, - Weight: moderately heavy, heavy, - Shrankage: comparatively large,

STRENGTH CLASSES: very strong, strong,

SEASONING - Air drying rates: slow, - Checking: - Deformation:

NATURE DUARBILITY: durable, RESISTANCE TO TERMITES: yes, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: difficult, USES: House building Interior finish, Durable timber. Ship and boat manufacturing, Vehicle, Furniture, Veneer, Musical instruments.

Packing boxes, Carvinge, Tool handle, Novelties,

GEOGRAPHIC DISTRIBUTION: Burma, Thailand, Malaysia, Philippines, Indonesia, Fiji,

GROWTH RINGS: distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, Vessel element mean length: 350-800um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: aliform, confluent,

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate and multiseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

Locality of growth							Maximum crushingstrength MPa
Malaysia	5	15.0	0.68	0.800	116 121	15.4 15.0	58.2 63.3
	•			Shear paral		•	ce to splittiing N/cm lane T-plane
9.17 9	.17 . 6	679 6679		12.	5 14.2	75	82

BOTANICAL NAME: Kingiodendron alternifolium Merr. et Rolfe (Leguminosae) LOCAL NAME: Apiitan, magbalago, danggai, tabalangon (Ph.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: brown, red, - Odour: indistinct, - Grain: straight to fairly interlocked. - Texture: fine. - Weight: moderately heavy. - Shrankage: large. STRENGTH CLASSES: medium. SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: non-durable. RESISTANCE TO TERMITES: moderately, WORKING QUALITIES: easy. USES: House building, Interior finish, Furniture. GEOGRAPHIC DISTRIBUTION: Philippines. GROWTH RINGS: distinct. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: <5/sq.mm. 5-20/sq.mm. - Vessel element mean length: 350-800um. Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: vasicentric, aliform, - Banded: 1-3 cells, >3 cells, RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary, chambered, MISCELLANEOUS: Axial intercellular canals in long tangential lines. Axial intercellular canals in diffuse.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth	No.of trees tested	Moisture content %	Densit Basic density	y g/cm³ Air-dry density	Bending strength MPa	Modulus of elasticity GPa	Maximum crushingstrength MPa
	imit		dness N.	Shear parale	el to grain MPa	•	ce to splittiing N/cm
			1 2	1			

TRADE NAME: Managis BOTANICAL NAME: Koompassia excelsa Taubert (Leguminosae) LOCAL NAME: Bengaris, Wehis, Menggeris (In.): Ginoo (Ph.): Kayu raja, Tapang (Sar.) Mengaris (Sab. Sar.): Tualang (M. In.): Yuan (Th.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: red. - Odour: indistinct. - Grain: interlocked, wavy. - Texture: coarse, - Weight: heavy. - Shrankage: very small. STRENGTH CLASSES: strong. SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation. RESISTANCE TO TERMITES: no. AMENABILITY TO PRESERVATIVE TREATMENT: medium, WORKING QUALITIES: moderately difficult, NATURE DUARBILITY: durable. USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, Veneer, Plywood. Agricultural implement wood. Household appliance. Fuel. GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Philippines, Indonesia, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: >200. - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: confluent, - Banded: >3 cells, RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells; ordinary, chambered, MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Included phloem concentric.

Locality of growth	•	s Moisture Den content % Basic densit		•	Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines	į i	12 0.70	0.864	146 134	18.1 16.8	76.2 70.4
Stress at proportionality		Hardness N. Side grain end grain	Shear parat R		:	nce to splittiing N/cm lane T-plane
12.4	10.7	9410 8563 10400 9	464 12.	6 13.0		

TRADE NAME: Kempas BOTANICAL NAME: Koompassia malaccensis Maing (Leguminosae) LOCAL NAME: Empas (Sab.): Impas (Bor. In. Sab.): Mengeris. Pah. upil (In.): Thong. bueng (Th.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: red. with streaks. - Odour: indistinct. - Grain: interlocked, - Texture: coarse, - Weight: heavy, very heavy, - Shrankage: small,

STRENGTH CLASSES: very strong, strong,

SEASONING - Air drying rates: moderately fast, - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: moderately durable. RESISTANCE TO TERMITES: no. AMENABILITY TO PRESERVATIVE TREATMENT: good. WORKING QUALITIES: moderately difficult. USES: House building, Interior finish, Durable timber, Vehicle, Furniture,

Cooperage, Tool handle, Fuel,

1.25

GEOGRAPHIC DISTRIBUTION: Brunei, Malaysia, Indonesia,

GROWTH RINGS: moderately distinct, indistinct or absent;

VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse.

- Perforation plates: simple. Intervessel pits: alternate. vestured pits present.
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: >200,
- Vessel No.: <5/sq.mm. Vessel element mean length: 350-800um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: very thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: aliform, confluent.

RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III, heterogeneous type III,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells. - crystalliferous cells: chambered.

MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied,

Included phloem concentric.

Locality of growth No.of trees Moisture tested content % Basic of				
malaysia 5 15.1 0	.71 0.850	122 127	18.6 18.1	65.6 71.6
Stress at limit Hardness N. proportionality MPa Side grain end			Resistance R-Pla	
	12.	4 14.1	60	67

3.30.35

TRADE NAME: Thinwin BOTANICAL NAME: Milletia lencantha Kurz (Leguminosae) LOCAL NAME: Theng-weng (Bur): Sa-thon(Th.) HABIT OF TREE: medium tree, large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: purple, with streaks. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: medium. - Weight: very heavy. - Shrankage: STRENGTH CLASSES: strong. SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation: NATURE DUARBILITY: very duarble. WORKING QUALITIES: difficult. USES: House building, Interior finish, Durable timber, Furniture, Veneer, Agricultural implement wood, Household appliance, Novelties, GEOGRAPHIC DISTRIBUTION: Burma, Thailand, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present.

- Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 100-200um,

- Vessel No.: <5/sq.mm. - Vessel element mean length: <350um, Gums and other deposits, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: 900-1600um. - Wall thickness: very thick. AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: scanty, aliform, - Banded: >3 cells, RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: homogeneous multiseriate. MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered, MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied,

Locality of growth No.of trees tested	Moisture Densit				
1			l		l
Stress at limit proportionality MPa	Kardness N. Side grain ∣ end grain				ce to splittiing N/cm lane T-plane
1		1			

TRADE NAME: Petai BOTANICAL NAME: Parkia singularis Miq. (Leguminosae)
LOCAL NAME: Petai meranti (M.): Kupang (Sab.)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: white to grey, yellow, - Odour: indistinct,

- Grain: straight to fairly interlocked. - Texture: coarse. - Weight: moderately heavy. - Shrankage: yery small,

STRENGTH CLASSES: weak.

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable, AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: easy,

USES: Interior finish, Plywood,

Packing boxes, Disposable chopsticks etc.,

GEOGRAPHIC DISTRIBUTION: Malaysia,

GROWTH RINGS: moderately distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
 - Vessel No.: <5/sq.mm. Vessel element mean length: <350um. Gums and other deposits.

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: aliform, confluent,

- RAYS interconnected (fused) rays, Width: commonly 4-10 seriate, Numbers: 4-12/mm,
 - Ray tissues: homogeneous multiseriate, homogeneous uniseriate and multiseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

Locality of growth No.of tree	s Moisture Densi content % Basic density	ty g/cm3 Air-dry density	Bending strength	Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia	1,15	0.70	55 57.3	10.7 10.4	30.8 33.5
Stress at limit proportionality MPa	Hardness N. Side grain ∣ end grain	Shear paralo	el to grain MPa	Resistan R-P	ce to splittiing N/cm lane T-plane
·2.,	41 M	7.4	8.4		

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TRADE NAME: Jemerelang BOTANICAL NAME: Peltophorum dasyrachis Kurz ex Baker (Leguminosae) LOCAL NAME: Hoang Linh (Viet. Cam.); Cha kham, Nontri (Th.); Treas (Cam.); Trasec (Cam. Viet)

HABIT OF TREE: medium tree, large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: red, with streaks, - Odour: indistinct, - Grain: interlocked, - Texture: fine, - Weight: light, moderately heavy, - Shrankage: very small,

STRENGTH CLASSES: medium, weak,

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: RESISTANCE TO TERMITES: no, WORKING QUALITIES: easy,

USES: House building, Interior finish, Furniture, Veneer, Plywood,

Packing boxes, Turnery wood.

GEOGRAPHIC DISTRIBUTION: Vietnam, Laos, Cambodia, Thailand, Malaysia, Indonesia,

GROWTH RINGS: distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits. Mean T.D.: 100-200um.
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: 350-800um, Gums and other deposits.

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: aliform, confluent,

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate and multiseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

·	,		· ·	Modulus of Maximum crushingstrength elasticity GPa MPa
Thailand	16	0.82	106.1	10.29 39.6
Stress at limit proportionality MPa	Hardness N. Side grain end grain	•		Resistance to splittiing N/cm R-Plane T-plane
1		6.6	15.5	

TRADE NAME: Kungkur

BOTANICAL NAME: Pithecellobium splendens (Mig.) Corner (Leguminosae)

LOCAL NAME:

HABIT OF TREE: medium tree, large tree,

PHYSICAL PROPERTIES - Heartwood and Sabwood: clearly distinct.. - Heartwood Color: brown. red. - Odour: indistinct.

- Grain: straight to fairly interlocked. - Texture: coarse. - Weight: moderately heavy. - Shrankage: very small.

STRENGTH CLASSES: medium, weak.

SEASONING - Air drying rates: moderately slow. - Checking: slight risk of checking. - Deformation: no risk of deformation,

NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: moderately, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: easy,

USES: House building, Interior finish, Furniture, Veneer, Plywood,

Carvinge,

GEOGRAPHIC DISTRIBUTION: Malaysia,

GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present,

- Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: >200,

- Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Paratracheal p.: vasicentric, aliform, confluent,

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RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate and multiseriate,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth			y g/cm3 Air-dry density		Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia		15	0.75	89 92.7	10.7 10.4	44.1 47.9
Stress at li proportionality			Shear paral R	el to grain MPa	!	ce to splittiing N/cm lane T-plane
6.62 7.	4		12.	8 14.5		

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TRADE NAME: Amboyna BOTANICAL NAME: Pterocarpus indicus Willd. (Leguminosae) LOCAL NAME: Angsana (Sar.): Padauk (Bur.): Narra (Ph.): N. G. rosewood, Padauk (P. N.): Sena (M.): Pradoo (Th.): Linggoa, sandana, Oele, Tiempaga, Sonokembang (In HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: brown, red. with streaks. - Odour: distinct. - Grain: oblique, straight to fairly interlocked. - Texture: medium. - Weight: moderately heavy. - Shrankage: very small. STRENGTH CLASSES: medium. SEASONING - Air drying rates: moderately slow. - Checking: no risk of checking. - Deformation: no risk of deformation. NATURE DUARBILITY: very duarble. RESISTANCE TO TERMITES: yes. WORKING QUALITIES: easy. USES: Interior finish. Ship and boat manufacturing, Vehicle, Furniture. Turnery wood. Novelties. GEOGRAPHIC DISTRIBUTION: Burma, Malaysia, Philippines, Indonesia, India, GROWTH RINGS: distinct, VESSELS/PORES - Porosity: wood semi-ring-porous, wood diffuse-porous. - Arrangement: in diffuse.

4.

- Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm, - Vessel element mean length: <350um, Gums and other deposits,

- Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present,

0.00

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,
AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: scanty, aliform, confluent, - Banded: 1-3 cells, >3 cells,
RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, >12/mm, - Ray tissues: homogeneous uniseriate, homogeneous uniseriate and multiseriate,
MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,
MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied,

Locality of growth	•	•	•		Bending strength MPa	•	Maximum crushingstrength MPa
Philippines	8	12	0.52	0.614	93.4 85.6	11.7 10.9	53.8 49.7
	limit ty MPa		dness N.	Shear paral R	el to grain MPa T	:	nce to splittiing N/cm Plane T-plane
9.76	8.44	4530 4122	5550 505	1 10.	.9 11.3	1	

TRADE NAME: burma padauk BOTANICAL NAME: Pterocarpus macrocarpus Kurz (Leguminosae)
LOCAL NAME: Pradoo, Pradu, mai Pradoo (Th.); May-dou (L.)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: red. - Odour: indistinct.

- Grain: interlocked, · - Texture: medium, - Weight: heavy, - Shrankage:

STRENGTH CLASSES: strong,

SEASONING - Air drying rates: slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: very duarble. RESISTANCE TO TERMITES: yes. WORKING QUALITIES: difficult.

USES: Interior finish, Durable timber, Vehicle, Furniture, Veneer, Musical instruments,

Agricultural implement wood, Carvinge, Tool handle, Novelties, Oil press,

GEOGRAPHIC DISTRIBUTION: Laos, Burma, Thailand,

GROWTH RINGS: distinct, moderately distinct,

VESSELS/PORES - Porosity: wood semi-ring-porous, wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, Vessel element mean length: <350um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: aliform, confluent, - Banded: 1-3 cells, >3 cells,

RAYS - Width: exclusively uniseriate, - Numbers: 4-12/mm, >12/mm, - Ray tissues: homogeneous uniseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

MISCELLANEOUS: Rays storied. Axial parenchyma storied, Vessels storied, Fibres storied.

Locality of growth		Moisture Densi content % Basic density				
Thailand	Į.	1 11	0.83	128.4	12.45	63.8
	•	Hardness N. Side grain end grain	Shear paral	el to grain MPa . T	<u>.</u>	ce to splittiing N/cm lane T-plane
			15	.9 21.9		

TRADE NAME: Raintree BOTANICAL NAME: Samanea samana (Jacq.) Merr. (Leguminosae)

LOCAL NAME: Kampoo (Th.); Kihudiau, Trembesi (In.); Monkepod Tree (Ph.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: brown, with streaks, - Odour: indistinct, - Grain: oblique. - Texture: fine. - Weight: light. - Shrankage: very small.

1.00

STRENGTH CLASSES: very weak.

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: no risk of deformation,

NATURE DUARBILITY: non-durable, WORKING QUALITIES: easy,

USES: Interior finish, Furniture, Plywood,

Carvinge,

GEOGRAPHIC DISTRIBUTION: Philippines, Indonesia, China,

GROWTH RINGS: distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, Vessel element mean length: <350um,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Paratracheal p.: vasicentric, aliform, confluent,

RAYS - Width: 1-3 cells; commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: homogeneous multiseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells. - crystalliferous cells: chambered,

Locality of growth	<u> </u>	•		y g/cm3 Air-dry density	•	Modulus of elasticity GPa	Maximum crushingstrength
Philippines	6	12	0.48	0.557	57.5 52.7		
Stress at l proportionality			dness N.	Shear paral R	el to grain MPa	<u>:</u>	ce to splittiing N/cm lane T-plane
8.24 7	.13	5030 4577	5200 473	2 10.	3 10.7		

TRADE NAME: Sepetir BOTANICAL NAME: Sindora beccariana Baill (Leguminosae) LOCAL NAME: Sampit, separantu, sindur (In.): Sepetir, berduri (Br.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: yellow. - Odour: distinct. - Grain: straight. - Texture: fine. - Weight: moderately heavy. - Shrankage: small. STRENGTH CLASSES: medium. SEASONING - Air drying rates: moderately slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: durable. AMENABILITY TO PRESERVATIVE TREATMENT: low. WORKING QUALITIES: moderately difficult. USES: House building, Interior finish, Ship and boat manufacturing, Vehicle, Furniture, Plywood, Sporting goods. Packing boxes, Novelties, GEOGRAPHIC DISTRIBUTION: Brunei, Malaysia, Indonesia, GROWTH RINGS: distinct. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: 900-1600um. - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: vasicentric, RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate and multiseriate, heterogeneous type III, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered, MISCELLANEOUS: Axial intercellular canals in long tangential lines,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth No.o	f trees ested	Moisture Densit	y g/cm3 Air-dry density	Bending strength	. Modulus of elasticity GPa	Maximum crushingstrength MPa
1		1		1		1
		Hardness N. Side grain end grain				
					1	

11.00

14.00 mg 1

8 18 m 38 3

TRADE NAME: Sindoer BOTANICAL NAME: Sindora cochinchinensis Baill. (Leguminosae) LOCAL NAME: Go. Gomat. Gu (Viet.): Krakas. Krakas sbek. Krakas meng (Cam.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: purple, with streaks. - Odour: indistinct. - Grain: interlocked. - Texture: fine, - Weight: heavy, - Shrankage: small, comparatively large, STRENGTH CLASSES: strong. SEASONING - Air drying rates: slow. - Checking: - Deformation: NATURE DUARBILITY: durable. WORKING QUALITIES: difficult. USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, Sporting goods, Novelties. GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, Thailand. GROWTH RINGS: moderately distinct, VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: <350um, Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick,

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AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: scanty, vasicentric, aliform,

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

MISCELLANEOUS: Axial intercellular canals in long tangential lines,

Locality of growth	No.of trees tested	Moisture content % Ba	Densit asic density	y g/cm3 Air-dry density	Bending strength	Modulus of elasticity GPa	Maximum crushingstrength MPa
Vietnam		12		0.88	123.5		69.0
Stress at li proportionality	mit MPa	. Kardne: Side grain	ss N. end grain	Shear paral R	el to grain MPa T	Resistan R-P	ce to splittiing N/cm lane T-plane
	l			1		İ	

TRADE NAME: Pyinkado BOTANICAL NAME: Xylia xylocarpa (Roxb.) Taub. (Leguminosae) LOCAL NAME: Cam xe (Cam. Th. Viet.): Sokram (Cam.): Deng (Th.) Irul (Ind.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: red. with streaks. - Odour: indistinct. - Grain: interlocked. - Texture: fine, - Weight: very heavy, - Shrankage: very large, STRENGTH CLASSES: very strong. SEASONING - Air drying rates: very slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: very duarble. RESISTANCE TO TERMITES: yes. WORKING QUALITIES: very difficult. USES: Durable timber, Ship and boat manufacturing, Vehicle, Agricultural implement wood. Bent wood. GEOGRAPHIC DISTRIBUTION: Laos, Cambodia, Burma, Thailand, China, India, GROWTH RINGS: distinct, VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - yestured pits present. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: 5-20/sq.mm. - Vessel element mean length: 350-800um, Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: yery thick,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells. - crystalliferous cells: chambered.

AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: vasicentric, aliform, confluent, RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, >12/mm, - Ray tissues: homogeneous uniseriate and multiseriate.

Locality of growth	•	•		Bending strength MPa	,	Maximum crushingstrength MPa
Vietnam	l	12	1.14	134.6		76.3
	limit y MPa		,	el to grain MPa ĭ	:	ce to splittiing N/cm lane T-plane
	1		1		l	

TRADE NAME: Burma vellow heart BOTANICAL NAME: Fagraea fragrans Roxb. (Loganiaceae) LOCAL NAME: Anan (Bur): Tatrau (Cam.); Kan krao (Th.); Trai (Viet. Cam.); Tam sao (Viet.); Tembusu padang (M.): Temasuk (Sab.); Tembesu talang (In.); Urung (Ph.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow. - Odour: distinct. - Grain: straight to fairly interlocked. - Texture: fine, - Weight: heavy, - Shrankage: very small, STRENGTH CLASSES: strong, medium. SEASONING - Air drying rates: very slow. - Checking: slight risk of checking, RESISTANCE TO TERMITES: yes, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately easy. NATURE DUARBILITY: durable. USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, Culture, Household appliance, Carvinge, GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, Burma, Thailand, Malaysia, Indonesia, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern, in diffuse. - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present. - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sg.mm. - Vessel element mean length: 350-800um, - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: 900-1600um. - Wall thickness: very thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Banded: 1-3 cells, >3 cells,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

RAYS - Width: exclusively uniseriate, - Numbers: >12/mm, - Ray tissues: heterogeneous uniseriate.

Locality of growt	•	es Moisture Dens content % Basic density		-	•	•
Malaysia	2	17.2 0.72	0.865	95 107	14.0 14.1	52.0 62.7
		i i	•	lel to grain MPa ĭ		ce to splittiing N/cm lane T-plane
8.00	8.79	6540 6972	10	.3 12.5	37	40

TRADE NAME: Leza byu BOTANICAL NAME: Lagerstroemia calyculata Kurz. (Lythraceae) LOCAL NAME: Tabaek, Intanin, Bang lang (Th.); Pyimma-hpyoo (Bur.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: brown, - Odour: indistinct, - Grain: straight. oblique. - Texture: fine. - Weight: heavy. - Shrankage:

STRENGTH CLASSES: strong,

SEASONING - Air drying rates: - Checking: hight risk of checking, - Deformation: hight risk of deformation,

NATURE DUARBILITY: non-durable, WORKING QUALITIES: moderately difficult.

USES: House building, Interior finish, Furniture,

Agricultural implement wood, Tool handle, Gunstocks,

GEOGRAPHIC DISTRIBUTION: Burma, Thailand,

GROWTH RINGS: distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple. Intervessel pits: alternate. vestured pits present.
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: 350-800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: scanty, - Banded: 1-3 cells, >3 cells,

RAYS - Width: exclusively uniseriate, - Numbers: >12/mm, - Ray tissues: homogeneous uniseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

Locality of growth No.of trees	Moisture Densi content % Basic density				
Thailand	14	0.72	114.5	11.08	50.0
Stress at limit proportionality MPa	Hardness N. Side grain end grain	, ,	el to grain MPa		ce to splittiing N/cm lane T-plane
1		18	19.6		

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TRADE NAME: Bungor BOTANICAL NAME: Lagerstroemia speciosa Pers. (Lythraceae)
LOCAL NAME: Pyinma (Bur.); Intanin, Tabeck (Th.); Banglang (Viet.); Banaba (Ph.); Bungur (In.); Jarul (Ind. Ba.)

HABIT OF TREE: large tree,
PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: brown, red, - Odour: indistinct,

- Grain: straight to fairly interlocked. - Texture: fine, medium. - Weight: moderately heavy. - Shrankage: very large.

STRENGTH CLASSES: strong, medium,

SEASONING - Air drying rates: - Checking: - Deformation:

NATURE DUARBILITY: durable, RESISTANCE TO TERMITES: yes, AMENABILITY TO PRESERVATIVE TREATMENT: medium, WORKING QUALITIES: easy,

USES: House building, Interior finish, Ship and boat manufacturing, Veneer, Plywood,

Agricultural implement wood,

GEOGRAPHIC DISTRIBUTION: Vietnam, Burma, Thailand, Philippines, Indonesia, China,

GROWIH RINGS: moderately distinct,

VESSELS/PORES - Porosity: wood semi-ring-porous, wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple. Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: 350-800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: confluent, - Banded: 1-3 cells, >3 cells,

RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm, >12/mm,

- Ray tissues: homogeneous uniseriate and multiseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

Locality of growth				y g/cm3 Air-dry density	•	Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines	2	12	0.53	0.671	96.6 88.6	10.6 9.83	50.0 46.2
	imit MPa		ness N. end grain	Shear paral . R	el to grain MPa	Resistan R-P	ce to splittiing N/cm lane T-plane
9.34 8	.08 / 6	5300 5733	7290 6634	4 10.	7 11.1		

TRADE NAME: Chempaka BOTANICAL NAME: Aromadendron elegans Bl. (Magnoliaceae)

LOCAL NAME: Chempaka hutan (M.); Djalaprang, Maleoewei, Malaban, Utep, Utap-utap (In.)

HABIT OF TREE: medium tree, large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: brown, green, - Odour: indistinct, - Grain: straight. - Texture: fine. - Weight: moderately heavy. - Shrankage: very small.

STRENGTH CLASSES: weak.

SEASONING - Air drying rates: moderately fast, - Checking: - Deformation:

NATURE DUARBILITY: moderately durable, RESISTANCE TO TERMITES: no, WORKING QUALITIES: easy,

USES: House building, Interior finish, Furniture, Veneer, Plywood, Culture,

GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Indonesia,

GROWTH RINGS: distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: scalariform, Intervessel pits: scalariform,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: >800um,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: terminal.

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II,

Locality of growth No. of trees	Moisture Densit content % Basic density				
	14		70.9 70.9	· 	·
Stress at limit proportionality MPa		Shear paral	el to grain MPa	•	ce to splittiing N/cm lane T-plane
· I		3.6 4.0	3.97 4.4	1	

BOTANICAL NAME: Elmerrillia papuana Dandy (Magnoliaceae) TRADE NAME: Way beech . LOCAL NAME: HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow. - Odour: indistinct. - Grain: straight to fairly interlocked, - Texture: fine, - Weight: light, - Shrankage: STRENGTH CLASSES: weak, SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: non-durable. WORKING QUALITIES: easy. USES: Interior finish, Ship and boat manufacturing, Vehicle, Furniture, Veneer, Plywood, Culture, Packing boxes. Turnery wood, GEOGRAPHIC DISTRIBUTION: Papua New Guinea. GROWTH RINGS: distinct, VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: scalariform, - Intervessel pits: opposite-scalariform, scalariform, - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: terminal, RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II. MISCELLANEOUS: Oil and/or mucilage cells associated with ray parenchyma, Oil and/or mucilage cells associated with axial parenchyma.

4.45.

Locality of growth				Bending strength MPa		Maximum crushingstrength MPa
		1 . 1				[
				el to grain MPa		ce to splittiing N/cm lane T-plane
	.					

TRADE NAME: Mo-vang-tam BOTANICAL NAME: Manglietia fordiana (Hemsl.) Oliv. (Magnoliaceae)

LOCAL NAME: Vang-tam (Viet.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: yellow, green, - Odour: indistinct,

- Grain: straight, - Texture: very fine, - Weight: light, - Shrankage:

STRENGTH CLASSES: medium,

SEASONING - Air drying rates: - Checking: - Deformation:

NATURE DUARBILITY: moderately durable, RESISTANCE TO TERMITES: moderately, WORKING QUALITIES: easy,

USES: Interior finish, Furniture, Plywood,

Packing boxes, Carvinge, Pencils,

GROWTH RINGS: moderately distinct.

GEOGRAPHIC DISTRIBUTION: Vietnam. China.

VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse.

- Perforation plates: scalariform. Intervessel pits: opposite-scalariform, scalariform.
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 50-100um,
- Vessel No.: 20-40/sq.mm, Vessel element mean length: >800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Septate fibres: present, - Mean length: >1600cm, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: terminal,

- RAYS interconnected (fused) rays, Width: 1-3 cells, multiseriate portion(s) as wide as uniseriate, Numbers: 4-12/mm,
 - Ray tissues: heterogeneous type II, heterogeneous type III,

Locality of growth		Moisture Densi content % Basic density			Modulus of Maximum crushingstrength elasticity GPa MPa
Vietnam	· ·	12	0.45	81.2	47.7
	limit ty MPa	Hardness N. Side grain end grain	•	lel to grain MPa	Resistance to splittiing N/cm R-Plane T-plane
		,]	· · · · · · · · · · · · · · · · · · ·	

TRADE NAME: Chempaka BOTANICAL NAME: Michelia champaca L. (Magnoliaceae) LOCAL NAME: Champa (Th.); Su (Viet.); Chempaka merch (M.); Champaka (Ph. M.); Sagah, safan (Bur.); Tjempaka (In.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: yellow. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: fine. - Weight: light, moderately heavy. STRENGTH CLASSES: medium, weak. SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation, WORKING QUALITIES: easy, RESISTANCE TO TERMITES: no. AMENABILITY TO PRESERVATIVE TREATMENT: medium, NATURE DUARBILITY: moderately durable. USES: House building, Interior finish, Furniture, Venger, Plywood, Packing boxes. Battery separators, GEOGRAPHIC DISTRIBUTION: Vietnam, Burma, Thailand, China, India, Nepal, GROWTH RINGS: distinct, VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: scalariform. - Intervessel pits: opposite-scalariform, scalariform. - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sq.mm, - Vessel element mean length: >800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: terminal, - Banded: 1-3 cells, RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III,

And the second

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

MISCELLANEOUS: Oil and/or mucilage cells associated with ray parenchyma,

Locality of growth No.of trees	Moisture Densit content % Basic density			Modulus of elasticity GPa	
Indonesia	14.1	0.699	70.6 70.9	8.333 7.98	42.6 44.2
Stress at limit proportionality MPa	Hardness N. Side grain ∣ end grain	•			nce to splittiing N/cm Plane T-plane
		10.6 11.	6 11.7 12.8	3	

TRADE NAME: Gioi BOTANICAL NAME: Talauma gioi A. Chev. (Magnoliaceae) LOCAL NAME: Champak (Bur.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: yellow. - Odour: distinct. - Grain: straight. - Texture: fine. - Weight: moderately heavy. - Shrankage: comparatively large. STRENGTH CLASSES: medium. SEASONING - Air drying rates: moderately slow, - Checking: - Deformation: NATURE DUARBILITY: durable. RESISTANCE TO TERMITES: yes. WORKING QUALITIES: easy. USES: House building, Interior finish, Ship and boat manufacturing, Furniture, Plywood, Packing boxes, Carvinge, GEOGRAPHIC DISTRIBUTION: Vietnam, Burma, GROWTH RINGS: moderately distinct, VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: scalariform. - Intervessel pits: opposite-scalariform. scalariform. - Vessel-ray pitting: large, rounded, large, gash-like, - Vessel with helical thickenings. - Mean T.D.: 100-200um. - Vessel No.: 5-20/sq.mm. 20-40/sq.mm. - Vessel element mean length: 350-800um. >800um. - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: terminal.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

RAYS - interconnected (fused) rays, - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm,

- Ray tissues: heterogeneous type II, heterogeneous type III, MISCELLANEOUS: Oil and/or mucilage cells associated with ray parenchyma,

				Modulus of Maximum crushingstrength elasticity GPa MPa
Vietnam	12	0.58	105.5	59.3
		s N. Shear end grain R		Resistance to splittiing N/cm R-Plane T-plane
		l		1

TRADE NAME: Jongkong BOTANICAL NAME: Dactylocladus stenostachys Olive. (Melastomataceae)

LOCAL NAME: Medang iongkong, Merebong(Sar.): Medang tabak(Sab.): Sammoinur(In.)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown. red. - Odour: indistinct.

- Grain: straight to fairly interlocked, - Texture: - Weight: light, moderately heavy, - Shrankage: small, comparatively large,

7.13.

STRENGTH CLASSES: weak.

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: moderately durable, non-durable, RESISTANCE TO TERMITES: no, AMENABILITY TO PRESERVATIVE TREATMENT: medium, WORKING QUALITIES: eas

USES: House building, Interior finish, Furniture, Plywood,

GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia,

tion, and the

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: - Intervessel pits: alternate. - vestured pits present.

- Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.:

- Vessel No.: - Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: scanty, aliform, confluent.

RAYS - Width: exclusively uniseriate, - Numbers: >12/mm, - Ray tissues: heterogeneous uniseriate,

Locality of growth			Densi Basic density								
Malaysia		15	1	.:	0.633	72.5	75.5	11.2	10.9	38.3	41.6
Stress at li proportionality	•		dness N.	•				Re		to split	- -
	1				9.3	10.6	3	·			

TRADE NAME: Nipis kulit BOTANICAL NAME: Memecylon pubescens King. (Melastomataceae) LOCAL NAME: Delek tembaga (P. M.) HABIT OF TREE: small tree, medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown. - Odour: indistinct. - Grain: interlocked. - Texture: fine. - Weight: heavy. - Shrankage: small. comparatively large. STRENGTH CLASSES: strong. SEASONING - Air drying rates: slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation. NATURE DUARBILITY: non-durable. AMENABILITY TO PRESERVATIVE TREATMENT: low. WORKING QUALITIES: difficult. USES: Ship and boat manufacturing. Tool handle, Fuel, GEOGRAPHIC DISTRIBUTION: Malaysia. GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse. - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits, FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered. - Mean length: <900um. - Wall thickness: very thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse. - Paratracheal p.: vasicentric. aliform. confluent. RAYS - Width: 1-3 cells, commonly 4-10 seriate. - Numbers: >12/mm, - Ray tissues: heterogeneous type I. heterogeneous type II. MISCELLANEOUS:

Included phloem diffuse,

Locality of growt		es Moisture Dens content % Basic density				
Malaysia] 3	15.8 0.77	0.945	1		67.0 75.8
	limit ty MPa	Hardness N. Side grain end grain	Shear paral	el to grain MPa	<u>'</u>	ce to splittiing N/cm lane T-plane
10.90	11.29	8770 8980	11.	.8 13.8		

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

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TRADE NAME: Goi tia BOTANICAL NAME: Aglaia gigantea Pellegin. (Meliaceae) LOCAL NAME: Beng kheoa (Cam.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: red. - Odour: indistinct. - Grain: interlocked. - Texture: fine. - Weight: moderately heavy. - Shrankage: comparatively large. STRENGTH CLASSES: medium, SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: durable. AMENABILITY TO PRESERVATIVE TREATMENT: low. WORKING QUALITIES: easy. USES: House building, Interior finish, Ship and boat manufacturing, Vehicle, Furniture, Veneer, Plywood, Gunstocks. GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, Burma, Indonesia. GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern, in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: scanty, vasicentric, aliform, RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III,

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Locality of grow	•	es Moisture Densi content % Basic density		•	Modulus of Maximum crushingstrength elasticity GPa MPa
Vietnam	1	12	0.56	80.8	54.9
Stress a		Hardness N. Side grain ∣ end grain	Shear paral	el to grain MPa	Resistance to splittiing N/cm

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TRADE NAME: Tasua .
                      BOTANICAL NAME: Amoora cucullata Roxb. (Meliaceae)
LOCAL NAME: Amoora (Pak., P. N., In.); Goi (Viet.); Thit nee (Bur.); Keramu, Jambangan (Br.)
HABIT OF TREE: large tree.
PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: red. - Odour: indistinct.
                    - Grain: interlocked, - Texture: medium, - Weight: light, moderately heavy, - Shrankage:
STRENGTH CLASSES: weak,
SEASONING - Air drying rates: moderately fast, - Checking: slight risk of checking. - Deformation: slight risk of deformation.
NATURE DUARBILITY: non-durable.
                                  RESISTANCE TO TERMITES: no.
                                                                WORKING QUALITIES: moderately easy.
USES: House building, Interior finish, Ship and boat manufacturing, Vehicle, Furniture, Veneer, Plywood,
      Wood mould, Turnery wood.
GEOGRAPHIC DISTRIBUTION: Vietnam, Burma, Thailand, Brunei, Indonesia, Papua New Guinea,
GROWTH RINGS: indistinct or absent.
VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,
              - Perforation plates: simple, - Intervessel pits: alternate.

    Vessel-ray pitting: similar to intervessel pits.
    Mean T.D.: >200.

               - Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits.
FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick,
AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: scanty, vasicentric, aliform, - Banded: 1-3 cells,
RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III,
MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,
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· · · · · · · · · · · · · · · · · · ·	•		•	Modulus of Maximum crushingstrength elasticity GPa MPa
Papua New Guinea	15 0.4	0.53	74.9	9.441
Stress at limit proportionality MPa	Hardness N. Side grain end grain	• •		Resistance to splittiing N/cm R-Plane T-plane
, I				

TRADE NAME: Kangko BOTANICAL NAME: Aphanamixis perrotteiana A. Juss. (Meliaceae) LOCAL NAME: HABIT OF TREE: small tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: red, - Odour: indistinct. - Grain: interlocked. - Texture: fine. - Weight: moderately heavy. - Shrankage: STRENGTH CLASSES: medium. SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: WORKING QUALITIES: easy. USES: House building, Interior finish, Vehicle, Furniture, Veneer, Plywood, Agricultural implement wood. GEOGRAPHIC DISTRIBUTION: Philippines. GROWTH RINGS: moderately distinct, VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple, - Intervessel pits: alternate, - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um, - Vessel No.: 5-20/sq.mm, - Vessel element mean length: >800um, Gums and other deposits. FIBRES AND FIBRE TRACKEIDS - Pits: simple to minutely bordered pits. - Septate fibres: common. - Mean length: >1600um. - Wall thickness: thin to thick. AXIAL PARENCHYMA - Paratracheal p.: scanty, vasicentric, - Banded: 1-3 cells, RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm, >12/mm, - Ray tissues: homogeneous uniseriate and multiseriate, MINERAL INCLUSIONS - Silica: present in ray cells, present in axial parenchma cells,

Locality of growth No.of trees tested	Moisture Densi content % Basic density	ty g/cm³ Air-dry density	Bending strength MPa	Modulus of elasticity GPa	Maximum crushingstrength MPa
Stress at limit proportionality MPa	Hardness N.		_	Resistan	ce to splittiing N/cm lane T-plane
				1	

TRADE NAME: Sentang BOTANICAL NAME: Azadirachta excelsa (Jack.) Jacobs (Meliaceae) LOCAL NAME: Limpaga (Sab.): Rang-gu (Sar.): Maranggo, Bird's-eve-kalantas (Ph.): Kaju bewang, Surian bawang (In.) HABIT OF TREE: large tree. . PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct.. - Heartwood Color: red. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: fine. - Weight: moderately heavy, heavy. - Shrankage: small.comparatively large. STRENGTH CLASSES: weak. SEASONING - Air drying rates: moderately fast, - Checking: slight risk of checking, - Deformation: slight risk of deformation. NATURE DUARBILITY: moderately durable. WORKING QUALITIES: easy. USES: House building, Interior finish, Furniture, Veneer, Plywood, Musical instruments. Packing boxes. GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, GROWTH RINGS: distinct. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: scanty, RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

	ees Moisture Densi d content % Basic density	• =		Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia	15	0.8	1		1
Stress at limit proportionality MPa		Shear paral R	el to grain MPa T		ce to splittiing N/cm lane T-plane
·		1		1	

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TRADE NAME: Pussur wood
                            BOTANICAL NAME: Carapa moluccensis Lamk. (Meliaceae)
LOCAL NAME: Indian crabwood, Poshur, dhundul (Ind.); Kyana, Kyathan, Pinle-on, Peng-lay-oang (Bur.); Piagau (Ph.)
HABIT OF TREE: large tree.
PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: red. with streaks. - Odour: indistinct.
                    - Grain: straight to fairly interlocked. - Texture: fine. - Weight: heavy. - Shrankage:
STRENGTH CLASSES: medium.
SEASONING - Air drying rates: - Checking: - Deformation:
NATURE DUARBILITY: durable,
                              RESISTANCE TO TERMITES: yes.
                                                             WORKING QUALITIES: easy.
USES: House building. Ship and boat manufacturing. Vehicle, Furniture.
      Wood mould, Tool handle, Novelties,
GEOGRAPHIC DISTRIBUTION: Burma, Thailand, Philippines, Indonesia, Bangladesh, India,
GROWTH RINGS: distinct,
VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,
               - Perforation plates: simple, - Intervessel pits: alternate,
               - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 50-100um. 100-200um.
               - Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits,
FIBRES AND FIBRE TRACKEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick.
AXIAL PARENCHYMA - Aportracheal p.: terminal. - Paratracheal p.: scanty, vasicentric.
RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III,
MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells,
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TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

ocality of growth No.of tre	es Moisture Der content % Basic densit	nsity g/cm3 y Air-dry density	Bending strength MPa `	Modulus of elasticity GPa	Maximum crushingstrength
	1			[1
	Hardness N. Side grain end grain				
1		1			

TRADE NAME: Central American Cedar BOTANICAL NAME: Cedrela odorata L. (Meliaceae) LOCAL NAME: Cigarbox cedor, South American cedar, West Indian cedar; Spanish cedar (Ph.): Cederwood (In.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: red. - Odour: distinct. - Grain: straight to fairly interlocked. - Texture: fine. - Weight: light. - Shrankage: comparatively large. STRENGTH CLASSES: weak. SEASONING - Air drying rates: moderately fast, - Checking: slight risk of checking, - Deformation: slight risk of deformation, NATURE DUARBILITY: moderately durable. RESISTANCE TO TERMITES: moderately. WORKING QUALITIES: easy. USES: House building, Interior finish, Ship and boat manufacturing, Furniture, Veneer, Plywood, Musical instruments. Packing boxes. GEOGRAPHIC DISTRIBUTION: Philippines, Indonesia, GROWTH RINGS: distinct. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple, - Intervessel pits: alternate, - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Septate fibres: present. - Mean length: 900-1600um. - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: vasicentric. RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, Druses or sand crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary, chambered, idioblast,

Locality of growth	•	•	•		-	Modulus of Max elasticity GPa	kimum crushingstrength MPa
Philippines	ļ 1	12	0.37	0.523	63.6 63.6	6.91 5.95	29.8 27.5
Stress at proportionalit			rdness N. n end grain	•	el to grain MPa	<u>:</u>	o splittiing N/cm T-plane
4.01	3.47	1940 176	5 2740 2493	6.5	4 6.76		·

TRADE NAME: Katong-Matsin BOTANICAL NAME: Chisocheten pentandrus (Blanco) Merr. (Meliaceae) LOCAL NAME: Katong-maching(Ph.) HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: yellow, brown, - Odour: indistinct. - Grain: interlocked, - Texture: fine, - Weight: moderately heavy, - Shrankage: large. STRENGTH CLASSES: medium. SEASONING - Air drying rates: - Checking: - Deformation: slight risk of deformation. NATURE DUARBILITY: moderately durable, AMENABILITY TO PRESERVATIVE TREATMENT: medium. WORKING QUALITIES: moderately easy. USES: House building, Interior finish, Furniture, Veneer, Plywood, Turnery wood. GEOGRAPHIC DISTRIBUTION: Philippines, GROWIH RINGS: indistinct or absent, VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: 5-20/sg.mm, - Vessel element mean length: 350-800um, Guns and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: scanty, aliform, - Banded: 1-3 cells, >3 cells, RAYS - interconnected (fused) rays. - Width: 1-3 cells. - Numbers: 4-12/mm. - Ray tissues: heterogeneous type II, heterogeneous type III,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells. - crystalliferous cells: chambered.

محود بالتراض مرتبي

Locality of growth	No.of trees tested		1	ty g/cm3 Air-dry density	Bending strength MPa	Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines	1	12	0.52	0.648	94.0 86.2	10.5 9.74	48.1 44.4
Stress at l proportionality			dness N.	Shear paral R	el to grain MPa	1	ce to splittiing N/cm lane T-plane
8.41 7	.27	4790 4359	6070 552	4 7.3	9 7.64		

BOTANICAL NAME: Chukrasia tabularis A. Juss. (Meliaceae) TRADE NAME: Chittagong wood LOCAL NAME: Surian Batu, Cherana puteh, Repoh, Suntang, Suntang puteh(M.); Lat hoa(Viet); Yeng-ma, taw-yengma, Yinma(Bur.); Yom him(Th.); Chickrassy(Ind. Bur. Ba. HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: brown. - Odour: indistinct. - Grain: interlocked. - Texture: fine, - Weight: moderately heavy, - Shrankage: very small, STRENGTH CLASSES: medium. SEASONING - Air drying rates: fast, - Checking: slight risk of checking, - Deformation: no risk of deformation, NATURE DUARBILITY: durable, RESISTANCE TO TERMITES: no. AMENABILITY TO PRESERVATIVE TREATMENT: medium. WORKING QUALITIES: moderately difficult. USES: House building, Interior finish, Ship and boat manufacturing, Vehicle, Furniture, Veneer, Musical instruments, GEOGRAPHIC DISTRIBUTION: Vietnam, Laos, Burma, Thailand, Malaysia, Parkistan, India, GROWIH RINGS: moderately distinct. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple, - Intervessel pits: alternate, - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: present, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: scanty, vasicentric, RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III. MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: chambered,

	Locality of growth	No.of tr	ees M	oisture ontent %	Densit Basic density	Bending s	trength a	n Modulus of Maximum crushing elasticity GPa MPa				
-	Malaysia .	1		15.9	0.75	0.880	94	101	14.3	14.1	56.1	63.7
	Stress at U	limit / MPa	Si	Hardı de grain	ness N. end grain	Shear paral R	el to grain	MPa T	R		to spli	
	11.2	11.7	8990	9233		15.	3 17.8		[60	• • • • • • • •	71 ·

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TRADE NAME: Miau BOTANICAL NAME: Dysoxylum euphlebium Merr (Meliaceae)

HABIT OF TREE: small tree, medium tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: yellow, brown, - Odour: indistinct,

- Grain: interlocked. - Texture: fine. - Weight: moderately heavy, heavy. - Shrankage: small.

STRENGTH CLASSES: medium.

SEASONING - Air drying rates: slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: durable, RESISTANCE TO TERMITES: yes, AMENABILITY TO PRESERVATIVE TREATMENT: medium, WORKING QUALITIES: moderately easy, USES: House building. Durable timber. Ship and boat manufacturing, Vehicle, Furniture.

Agricultural implement wood, Turnery wood, Carvinge,

GEOGRAPHIC DISTRIBUTION: Philippines.

GROWIH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Paratracheal p.: scanty, - Banded: 1-3 cells,

- RAYS interconnected (fused) rays, Width: 1-3 cells, multiseriate portion(s) as wide as uniseriate, Numbers: 4-12/mm,
 - Ray tissues: homogeneous uniseriate and multiseriate, heterogeneous type III,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered, - Silica: present in ray cells,

Locality of growth										Bending st MPa					n crushingstr MPa	ength
Philippines	2	1	12		0.60		:	0.784	١	110	101	15.	7 14.6	58.2	53.8	
Stress at l	•				ness N.	ain	1	Shear p	paralel	to grain	MPa T	.			littiing N/ T-plane	cm/
10.9	9.43	59	50	5415	5990	5451			12.1	12.5						

TRADE NAME: Persian Lilac BOTANICAL NAME: Melia azedarach L. (Meliaceae) LOCAL NAME: China berry tree (USA.): Mindi (Sab.): Tamaga. Tha-ma-kha (Bur.): Xondi (In.): Paraiso(Ph.): Xoan (Viet) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: red. - Odour: indistinct. - Grain: straight, oblique. - Texture: medium. - Weight: Light. - Shrankage: small. STRENGTH CLASSES: weak, SEASONING - Air drying rates: - Checking: no risk of checking, - Deformation: no risk of deformation, RESISTANCE TO TERMITES: yes NATURE DUARBILITY: durable. WORKING QUALITIES: easy. USES: House building, Interior finish, Furniture, Plywood, Sporting goods. Packing boxes, Pulowood, GEOGRAPHIC DISTRIBUTION: Vietnam, Laos, Burma, Thailand, Malaysia, Indonesia, China, Parkistan, India, GROWTH RINGS: distinct. VESSELS/PORES - Porosity: wood ring-porous, wood semi-ring-porous, - Arrangement: in tangential, in diffuse, - Vessel grouping: clusters common, - Perforation plates: simple, - Intervessel pits: alternate, - Vessel-ray pitting: similar to intervessel pits. - Vessel with helical thickenings. - Mean T.D.: - Vessel No.: - Vessel element mean length: 350-800um. Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: present, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: scanty, vasicentric, RAYS - Width: commonly 4-10 seriate. - Numbers: <4/mm. 4-12/mm. - Ray tissues: homogeneous multiseriate, homogeneous uniseriate and multiseriate, heterogeneous type III,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered.

Locality of growth No.of tree	s Moisture Densi content % Basic density	ty_g/cm3 Air-dry density		Modulus of elasticity GPa	Maximum crushingstrength MPa
Indonesia	37.5		45.1	7.451	21.3
Stress at limit proportionality MPa	Hardness N. Side grain end grain		el to grain MPa	•	ce to splittiing N/cm lane T-plane
		2.4	4.3		

tally surface of

A 100 C 12

TRADE NAME: Sentul BOTANICAL NAME: Sandoricum koetiape (Burm. f.) Merr. (Meliaceae) LOCAL NAME: Kra-thon(Th.): Thitto (Bur.): Klampu (Sar.): Katon (Bur. Th. In.); Sau-dau (Viet.); Kompeng reach (Cam.); Ketjapi (In.); Santol (Ph.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: brown. red. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: - Weight: light, moderately heavy. - Shrankage: large, STRENGTH CLASSES: medium, weak, SEASONING - Air drying rates: - Checking: no risk of checking. - Deformation: no risk of deformation, WORKING QUALITIES: easy. NATURE DUARBILITY: non-durable, USES: House building, Interior finish, Furniture, Veneer, Plywood, Agricultural implement wood, Household appliance, Turnery wood, Carvinge, GEOGRAPHIC DISTRIBUTION: Vietnam. Burma, Thailand, Malaysia, Philippines, Indonesia, India, GROWTH RINGS: indistinct or absent, VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Paratracheal p.: aliform, confluent. RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III,

TADIC	OF	DUVCICAL	AND	MECHANICAL	PROPERTIES
IABLE	1117	PHISILAL	ANU	MELHANILAL	PRUPPRIIPS

ocality of growth No.of t		Density g/cm3 density Air-dry density			
1	- 1			<u> </u>	l
		. Shear para d grain R			
	1				

TRADE NAME: Mahogany BOTANICAL NAME: Swietenia mahagoni (L.) Jack. (Meliaceae)

LOCAL NAME: Mahoni, daun ketjil (In.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: red, - Odour: indistinct,

- Grain: straight to fairly interlocked, '- Texture: very fine, '- Weight: moderately heavy, '- Shrankage: very small,

STRENGTH CLASSES: weak,

SEASONING - Air drying rates: fast, - Checking: no risk of checking, - Deformation: no risk of deformation,

NATURE DUARBILITY: durable. AMENABILITY TO PRESERVATIVE TREATMENT: low. WORKING QUALITIES: easy.

USES: Interior finish, Furniture, Veneer, Musical instruments,

Wood mould, Turnery wood, Carvinge,

GEOGRAPHIC DISTRIBUTION: Indonesia.

GROWTH RINGS: distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits. Mean T.D.: 100-200um.
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: 350-800um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: scanty, vasicentric,

RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary, MISCELLANEOUS:

Intercellular canals of traumatic origin,

Locality of growth	No.of tree	s Moisture De content % Basic densi	nsity g/cm3 ty Air-dry der	Bending st	rength	Modulus of elasticity GPa	Maximum crushingstrength MPa
Indonesia		15	0.736	54.7	57.0	9.550 9.27	36.8 40
		Kard∩ess N. Side grain end grai				<u> </u>	ce to splittiing N/cm lane T-plane
	l		6.8	7.4 7.7	8.4	1	

BOTANICAL NAME: Toona ciliata Roem (Meliaceae) TRADE NAME: You hom LOCAL NAME: Red cedar (): Limpaga (M.): Suren, Suren Sabrang, surian biasa, Mapala, Koemea (In.): Chomcha (Cam.): Tuni (Nep.): Toon (Ind.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: red. - Odour: distinct. - Grain: straight. - Texture: coarse. - Weight: very light. light. - Shrankage: small. STRENGTH CLASSES: very weak. SEASONING - Air drying rates: moderately slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation, NATURE DUARBILITY: non-durable. AMENABILITY TO PRESERVATIVE TREATMENT: Low. WORKING QUALITIES: easy. USES: Interior finish. Ship and boat manufacturing, Furniture, Veneer, Plywood, Musical instruments, Wood mould, Household appliance, Turnery wood, Carvinge, GEOGRAPHIC DISTRIBUTION: Burma, Malaysia, Indonesia, China, India, Nepal, GROWTH RINGS: distinct. VESSELS/PORES - Porosity: wood semi-ring-porous. - Arrangement: in diffuse. - Perforation plates: simple, - Intervessel pits: alternate, - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: >200, - Vessel No.: <5/sq.mm. 5-20/sq.mm. - Vessel element mean length: 350-800um. Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Septate fibres: present. - Mean length: 900-1600um. - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal. - Paratracheal p.: scanty, vasicentric, RAYS - Width: 1-3 cells, commonly 4-10 seriate. - Numbers: 4-12/mm. - Ray tissues: heterogeneous type III, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells. - crystalliferous cells: ordinary.

Locality of growt	•	•			•	Modulus of Maximum crushingstrength elasticity GPa MPa
Malaysia	1	95	0.28	0.33	29 43	6.600 5.700 14.6 23.2
	ty MPa	Hard Side grain	ness N. end grain	Shear paral R	el to grain MPa	Resistance to splittiing N/cm R-Plane T-plane
				4.4	6.4	

TRADE NAME: Terap BOTANICAL NAME: Artocarpus elasticus Reinw (Moraceae)
LOCAL NAME: Malagumihan (Ph.); Koemboe, Kumut, Teo mongkoeni, Teureup, Tipoeloe (In.); Terap Ikal (Br.)
HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: yellow, - Odour: indistinct, - Grain: straight, - Texture: fine, medium, - Weight: light, - Shrankage: small,

STRENGTH CLASSES: very weak,

SEASONING - Air drying rates: moderately fast, - Checking: slight risk of checking, - Deformation: slight risk of deformation,
NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no, AMENABILITY TO PRESERVATIVE TREATMENT: medium, WORKING QUALITIES: easy,

USES: Interior finish, Furniture, Veneer, Plywood,

Household appliance, Turnery wood,

GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia,

GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,

- Perforation plates: simple. Intervessel pits: alternate.
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: >200,
- Vessel No.: <5/sq.mm. Vessel element mean length: 350-800um. Gums and other deposits.

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Septate fibres: present, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Paratracheal p.: aliform, confluent,

RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, - Sheath cells present, - Latex or tanniniferous tubes present,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

ocality of grow		es Moisture Dens content % Basic density				
Indonesia	l	12.6	0.490	48.82 50.2	8.53 7.41	27.84 26.6
		Hardness N. Side grain end grain		lel to grain MPa T		nce to splittiing N/cm Plane T-plane
	. 1		4.9 5.	29 5.2 5.	6	

TRADE NAME: Ainee BOTANICAL NAME: Artocarpus hirsutus Lamk. (Moraceae)
LOCAL NAME: Mit nai (Viet); Khnor prey (Cam.)

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PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: yellow, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: fine, medium, - Weight: moderately heavy, - Shrankage: comparatively large,

STRENGTH CLASSES: medium,

HABIT OF TREE: large tree.

SEASONING - Air drying rates: - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: very duarble, RESISTANCE TO TERMITES: yes, AMENABILITY TO PRESERVATIVE TREATMENT: good, low, WORKING QUALITIES: easy,

USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, Veneer, Plywood,

GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, India,

GROWTH RINGS: moderately distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple. Intervessel pits: alternate.
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Septate fibres: present, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Paratracheal p.: aliform, confluent, - Banded: >3 cells,

- RAYS interconnected (fused) rays, Width: commonly 4-10 seriate, Numbers: 4-12/mm,
 - Ray tissues: heterogeneous type II, Sheath cells present,

				Modulus of Maximum crushingstrength elasticity GPa MPa
India	12.9	0.695	91.47 87.3	11.67 11.0 56.67 55.1
•	Hardness N. Side grain ∣ end grain		lel to grain MPa	Resistance to splittiing N/cm R-Plane T-plane
.		1		1

TRADE NAME: Keledang BOTANICAL NAME: Artocarous lakoocha Roxb. (Moraceae) LOCAL NAME: Chaplash (Bur.): Manao. Mahat (Th.): Mit-nai (Viet.): Lokooch (M.): Lakuch (Ind.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: yellow, brown. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: fine. - Weight: moderately heavy. - Shrankage: STRENGTH CLASSES: strong. SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: durable. RESISTANCE TO TERMITES: moderately, AMENABILITY TO PRESERVATIVE TREATMENT: medium. WORKING QUALITIES: moderately easy. USES: House building. Ship and boat manufacturing. Furniture. Packing boxes. GEOGRAPHIC DISTRIBUTION: Vietnam, Burma, Thailand, Malaysia, India, GROWTH RINGS: moderately distinct, indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: large, rounded, large, gash-like. - Mean T.D.: 100-200um. - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um. - Tyloses: present. Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered. - Septate fibres: present. - Mean length: 900-1600um. - Wall thickness: thin to thick. AXIAL PARENCHYMA - Paratracheal p.: aliform, confluent, RAYS - Width: commonly 4-10 seriate, - multiseriate portion(s) as wide as uniseriate, - Numbers: 4-12/mm. - Ray tissues: heterogeneous type II, - Sheath cells present,

Locality of growth		Moisture Densi content % Basic density		•	
Stress at li proportionality	•		•	<u>.</u>	ce to splittiing N/cm lane T-plane
	1		1		

BOTANICAL NAME: Figus variegata Bl. (Moraceae) TRADE NAME. Ara LOCAL NAME: Arah. Kayu ara (Sab.): Tangisang Bayauak (Ph.): Fig (P. N.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: white to grey, yellow, - Odour: indistinct. - Grain: straight. - Texture: medium. - Weight: light. - Shrankage: STRENGTH CLASSES: very weak. SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: non-durable. RESISTANCE TO TERMITES: no. WORKING QUALITIES: moderately easy. USES: Plywood. Packing boxes. Household appliance, Buoys, GEOGRAPHIC DISTRIBUTION: GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. · - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: >200, - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick. AXIAL PARENCHYMA - Paratracheal p.: scanty, vasicentric, - Banded: >3 cells,

Service Age Care.

RAYS - interconnected (fused) rays, - Width: commonly 4-10 seriate, - Numbers: 4-12/mm,
- Ray tissues: heterogeneous type I, heterogeneous type II, - Sheath cells present, - Latex or tanniniferous tubes present,
MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: ordinary.

Locality of growth		Moisture Der content % Basic densi				Maximum crushingstrength MPa
Stress at l	imit MPa	Hardness N. Side grain end grai	Shear parat n R	el to grain MPa T	Resistan R-P	ce to splittiing N/cm lane T-plane

TRADE NAME: Ara berteh BOTANICAL NAME: Parartocarpus venenosus Becc (Moraceae)

LOCAL NAME: Terap (M.); Terap hutan (Sab.); Ara berteh paya (P. M.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: white to grey, yellow, - Odour: indistinct, - Grain: straight. oblique. - Texture: medium. - Weight: moderately heavy. - Shrankage: small

STRENGTH CLASSES: weak.

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation, NATURE DUARBILITY: non-durable, AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: moderately easy, USES: Plywood.

Packing boxes, Household appliance,

GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia, Papua New Guinea.

GROWTH RINGS: indistinct or absent.

VESSELS/PORES r Porosity: wood diffuse-porous. - Arrangement: in diffuse.

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: >200,
- Vessel No.: <5/sq.mm, Vessel element mean length: 350-800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Paratracheal p.: aliform, confluent,

RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate and multiseriate, - Latex or tanniniferous tubes present, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: ordinary,

Locality of growth	•	•				Modulus of elasticity GPa	Maximum crushingstrength MPa	1
Malaysia	3	17.0	0.47	0.595	68 [.] 76	12.0 12.0	34.8 41.6	· • •
Stress at l proportionality	•	Hardnes		Shear paral	el to grain MPa	•	ce to splittiing N/cm lane T-plane	
3.17	3.46 3	3290 3487		9.2	11.1	46	50	

TRADE NAME: Tempinis BOTANICAL NAME: Streblus elongatus (Miq.) Cornor (Moraceae)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: brown, red, - Odour: indistinct,

- Grain: interlocked. - Texture: fine. - Weight: very heavy. - Shrankage: very small.

STRENGTH CLASSES: very strong,

SEASONING - Air drying rates: moderately fast, - Checking: no risk of checking, - Deformation: no risk of deformation,

NATURE DUARBILITY: very duarble, RESISTANCE TO TERMITES: yes, WORKING QUALITIES: difficult,

USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle,

GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Indonesia,

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um.
- Vessel No.: 5-20/sq.mm, Vessel element mean length: <350um, Tyloses: present, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: present, - Mean length: 900-1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - Paratracheal p.: aliform, confluent,

- RAYS interconnected (fused) rays.. Width: 1-3 cells. Numbers: 4-12/mm.
 - Ray tissues: heterogeneous type II, heterogeneous type III,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

Locality of growth				y g/cm3 Air-dry density			Maximum crushingstrength MPa
Malaysia	3	13.7	0.81	0.975		1	89.6 91.1
Stress at l proportionality	•			Shear parale	l to grain MPa	•	ce to splittiing N/cm lane T-plane
15.45	4.55 1	2500 12013		18.7	20.5		

TRADE NAME: Amound BOTANICAL NAME: Eucalyptus alba Reinw ex Blume (Myrtaceae) LOCAL NAME: Gum (P. N.): Poplar gum (Aust.) HABIT OF TREE: medium tree, large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: red. - Odour: indistinct. - Grain: interlocked. - Texture: fine. - Weight: heavy. - Shrankage: comparatively large, large. STRENGTH CLASSES: strong, SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: very duarble, RESISTANCE TO TERMITES: yes, AMENABILITY TO PRESERVATIVE TREATMENT: medium. WORKING QUALITIES: moderately easy. USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, Sporting goods. Agricultural implement wood, Turnery wood, Carvinge, Tool handle, GEOGRAPHIC DISTRIBUTION: Indonesia, Papua New Guinea, . . GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Vessel grouping: exclusively solitary, - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present, - Vessel-ray pitting: large, rounded, - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm, 5-20/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present. Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered. - Mean length: 900-1600um. - Wall thickness: thin to thick. TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, - Banded: 1-3 cells.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm, >12/mm,

- Ray tissues: homogeneous uniseriate and multiseriate,

Locality of growth	No.of trees	Moisture	Densit	ty g/cm3	Bending strength	Modulus of	Maximum crushingstrength
	tested	content %	Basic density	Air-dry density	МРа	elasticity GPa	МРа
Indonesia	1	61.3	0.63	0.769	78.6 113.6	10.69 15.13	53.9 62.6
Stress at l proportionality				Shear paral R	el to grain MPa	:	ce to splittiing N/cm lane T-plane
			,	[5.8 . 6.3	14.1		

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TRADE NAME: Leda BOTANICAL NAME: Eucalyptus deglupta Bl. (Myrtaceae) LOCAL NAME: Bagras, Banikag (Ph.): Eucalyptus (M.): Mindanao gum (Aust.); Komo, Kamarere (P. N.); Deglupta (Fi.) HABIT OF TREE: large tree; PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: brown, red. - Odour: indistinct. - Grain: interlocked. - Texture: fine. - Weight: light. moderately heavy. - Shrankage: large. STRENGTH-CLASSES: medium. weak. SEASONING - Air drying rates: - Checking: - Deformation: slight risk of deformation. RESISTANCE TO TERMITES: no. NATURE DUARBILITY: moderately durable, WORKING QUALITIES: easy. USES: House building, Interior finish, Ship and boat manufacturing, Vehicle, Furniture, Veneer, Plywood, Wood based panel, Agricultural implement wood, Packing boxes, Wood mould, Cooperage, Turnery wood, Tool handle, Pulpwood, GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, Papua New Guinea, Fiii, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern, in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: large, rounded. - Mean T.D.: 100-200um.

- Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present;

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,

TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, vasicentric,

RAYS - Width: 1-3 cells, - Numbers: >12/mm, - Ray tissues: homogeneous uniseriate, homogeneous uniseriate and multiseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

Locality of growth	•	Moisture De content % Basic densi		•			Maximum crushingstrength MPa
Malaysia	1 1	98 0.40	0.465	. 50	67 - [7.5 8.9	24.7 36.7
 Stress at l proportionality 		Hardness N. Side grain ∣ end grai	•			•	ce to splittiing N/cm lane T-plane
2.87 2	.9	2710	[7.	3 9.0		49	48

TRADE NAME: Kelat BOTANICAL NAME: Eugenia polyantha Wight (Myrtaceae) LOCAL NAME: Obah (Sab.): Ubah (Sar.): Salam (In.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown, red. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: fine. - Weight: moderately heavy. - Shrankage: STRENGTH CLASSES: medium, weak, SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation: NATURE DUARBILITY: moderately durable. WORKING QUALITIES: easy. USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, ... Agricultural implement wood, GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia, GROWTH RINGS: indistinct or absent, VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present, Gums and other deposits,

. RAYS - interconnected (fused) rays, - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: >12/mm,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: aliform, confluent,

- Ray tissues: heterogeneous type II,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick,

Locality of growth	•	s Moisture content % Basic den			•	Maximum crushingstrength MPa
Indonesia	1	. 14.2	0.768	94.4 95.2	11.37 10.91	42.0 43.8
	MPa	Hardness N. Side grain ∣ end gr			:	e to splittiing N/cm ane T-plane
			5.7 6.5	6.3 7.2		

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TRADE NAME: Gelam
                      BOTANICAL NAME: Melaleuca leucadendron L. (Myrtaceae)
LOCAL NAME: Broad-Leaved-Tea-tree (P.N); Kayu puteh (In.); Niaouli(N.C.); Brown tra-tree, Paper bark(Aust.); Cajeput(U. S.); Smach chanlus(Cam.); Tea tree(P. N.);
            Tram (Viet.)
HABIT OF TREE: large tree.
PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown, red. - Odour: indistinct.
                    - Grain: oblique. - Texture: very fine. - Weight: moderately heavy, heavy. - Shrankage: small.
STRENGTH CLASSES: strong,
SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation: slight risk of deformation.
NATURE DUARBILITY: durable.
                             RESISTANCE TO TERMITES: yes. WORKING QUALITIES: moderately difficult,
USES: House building, Durable timber, Furniture,
      Food containers.
GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, Burma, Malaysia, Indonesia, Papua New Guinea, China,
GROWTH RINGS: indistinct or absent,
VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,
               - Vessel grouping: exclusively solitary. - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present.
               - Vessel-ray pitting: large, rounded, large, gash-like. - Mean T.D.: 100-200um.
               - Vessel No.: 5-20/sq.mm, 20-40/sq.mm, - Vessel element mean length: 350-800um.
FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick.
TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: scanty, vasicentric, - Banded: 1-3 cells,
RAYS - Width: exclusively uniseriate, - Numbers: >12/mm, - Ray tissues: heterogeneous uniseriate, heterogeneous type III,
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Locality of growth				y g/cm3 Air-dry density		Modulus of elasticity GPa	Maximum crushingstrength MPa
China	I :	15	0.64		1	1	1
Stress at l proportionality		Hardne Si <u>d</u> e grain		Shear para	lel to grain MPa	•	ce to splittiing N/cm lane T-plane
	[1		·	

TRADE NAME: Lara BOTANICAL NAME: Metrosideros Petiolata K. et V. (Myrtaceae)
LOCAL NAME: Kaiu Lara (In.)

- HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: purple, - Odour: indistinct,

- Grain: interlocked, - Texture: very fine, - Weight: very heavy, - Shrankage:

- STRENGTH CLASSES: very strong,

SEASONING - Air drying rates: - Checking: - Deformation:
NATURE DUARBILITY: very duarble, WORKING QUALITIES: difficult,
USES: House building, Durable timber, Ship and boat manufacturing,

Bedding wood material.

GEOGRAPHIC DISTRIBUTION: Indonesia, GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,

- Vessel grouping: exclusively solitary, Perforation plates: simple, Intervessel pits: alternate, extremely rare or absent, vestured pits present,
- Vessel-ray pitting: large, rounded, large, gash-like, Vessel with helical thickenings, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: 350-800um, Tyloses: present, Gums and other deposits,

FIBRES AND FIBRE TRACKEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: very thick,

TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, - Banded: 1-3 cells, RAYS - Width: exclusively uniseriate, 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous uniseriate, heterogeneous type III,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth	No.of trees tested	Moisture content %	Densit Basic density	y g/cm3 Air-dry den	Bending sity M	strength Pa	Modulus of elasticity GPa	Maximum crushingstrength MPa
Índonesia	l	16.9		1.355	138.1	154.8	17.06 17.04	79.22 94.3
Stress at proportionality	limit y MPa	· Hardr Side grain	ness N. end grain	Shear	paralel to grai	n MPa T	Resistan R-P	ce to splittiing N/cm lane T-plane
				11.96	12.65 14.	.4 15.2		

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TRADE NAME: Pelawan BOTANICAL NAME: Tristania conferta R.Br. (Myrtaceae)
LOCAL NAME: Selunsur (Sar.): Brush box (Aust.)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: red. - Odour: indistinct.

- Grain: straight to fairly interlocked. - Texture: fine. - Weight: heavy. - Shrankage: very large.

STRENGTH CLASSES: strong,

SEASONING - Air drying rates: - Checking: - Deformation: slight risk of deformation,

NATURE DUARBILITY: durable, RESISTANCE TO TERMITES: yes, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: difficult,

USES: House building, Durable timber, Ship and boat manufacturing, Vehicle, Sporting goods,

Agricultural implement wood,

GEOGRAPHIC DISTRIBUTION: Indonesia,

GROWTH RINGS: moderately distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Vessel grouping: exclusively solitary, Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 50-100um,
- Vessel No.: 5-20/sq.mm, 20-40/sq.mm, Vessel element mean length: 350-800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered. - Mean length: 900-1600um. - Wall thickness: thin to thick.

TRACHEIDS: vasicentric. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty,

RAYS - Width: exclusively uniseriate, - Numbers: >12/mm, - Ray tissues: homogeneous uniseriate,

Locality of growth							Modulus of elasticity GPa	Maximum crushingstrength MPa
Indonesia		67.6	0.69	0.844	72.2	125.6	12.16 16.75	35.5 69.4
								ce to splittiing N/cm lane T-plane
				5.6 7	.6 15.5		-[

TRADE NAME: Kirung BOTANICAL NAME: Nyssa javanica (Bl.) Wang (Nyssaceae)

LOCAL NAME: Khueng khak, Khang khok (Th.); Kalay, Chilauni(Ind.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: white to grey, yellow, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: fine, - Weight: moderately heavy, - Shrankage:

STRENGTH CLASSES: medium,

SEASONING - Air drying rates: - Checking: - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable. WORKING QUALITIES: easy.

USES: House building, Interior finish, Furniture, Veneer, Plywood,

Packing boxes, Food containers,

GEOGRAPHIC DISTRIBUTION: Vietnam, Laos, Burma, Thailand, Malaysia, China, India,

GROWTH RINGS: moderately distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: scalariform, Intervessel pits: opposite,
- Vessel-ray pitting: similar to intervessel pits. Mean T.D.: 100-200um.
- Vessel No.: 5-20/sq.mm, Vessel element mean length: >800um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick.

AXIAL PARENCHYMA - Aportracheal p.: diffuse, - absent or extremely rare,

- RAYS interconnected (fused) rays, Width: 1-3 cells, multiseriate portion(s) as wide as uniseriate, Numbers: 4-12/mm, >12/mm,
 - Ray tissues: heterogeneous type I, heterogeneous type II,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered.

Locality of growth No.of trees	Moisture Densi	ty g/cm3	Bending strength	Modulus of Maximum crushingstrength
	content % Basic density	Air-dry density	MPa	elasticity GPa MPa
Indonesia	13.9	0.722	71.18 70.9	11.57 11.05 48.92 50.2
Stress at limit	Hardness N.	Shear paral	el to grain MPa	Resistance to splittiing N/cm
proportionality MPa	Side grain end grain	R	T	R-Plane T-plane
1		6.76 7.2	5 7.4 8.0	

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WORKING QUALITIES: moderately easy.

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BOTANICAL NAME: Ochanostachys amentacea Mast. (Olacaceae) TRADE NAME: Petaling LOCAL NAME: Tanggal (Sab.): Petikal(Sar.): Tumbung asu(In.) HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapyood: distinct. - Heartwood Color: brown, red. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: fine. - Weight: heavy. - Shrankage: small. comparatively large. STRENGTH CLASSES: strong. SEASONING - Air drying rates: very slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: durable. AMENABILITY TO PRESERVATIVE TREATMENT: medium, low, USES: House building, Durable timber, Furniture. Packing boxes. Household appliance. GEOGRAPHIC DISTRIBUTION: Malaysia.

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GROWTH RINGS: moderately distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern,

- Perforation plates: scalariform. Intervessel pits: alternate.
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um.
- Vessel No.: 20-40/sq.mm, Vessel element mean length: >800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: >1600um, - Wall thickness: very thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse-in-aggregates, - Banded: 1-3 cells,

- RAYS interconnected (fused) rays. Width: 1-3 cells. Numbers: >12/mm.
 - Ray tissues: heterogeneous type I,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

Locality of growth				y g/cm3 Air-dry density		Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia] 3	16.4	0.73	0.915		l	56.1 65.2
Stress at l proportionality			ess N. end grain	Shear paral	el to grain MPa	•	ce to splittiing N/cm lane T-plane
6.28 6	.68	6360 6627		9.8	11.6	ĺ	·

TRADE NAME: Tamayuan BOTANICAL NAME: Strombosia philippinensis (Baill.) Rolfe (Olacaceae) LOCAL NAME: Larag., Larak, tamanhuyan (Ph.) HABIT OF TREE: medium tree, large tree, PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: purple, - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: very fine. - Weight: heavy. - Shrankage: STRENGTH CLASSES: strong. SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation: NATURE DUARBILITY: durable. WORKING QUALITIES: moderately difficult, USES: House building, Durable timber, Textile timber, Household appliance, Turnery wood, GEOGRAPHIC DISTRIBUTION: Philippines. GROWTH RINGS: distinct, VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, - Perforation plates: scalariform. - Intervessel pits: opposite-scalariform. .~ Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 50-100um, - Vessel No.: 40-100/sg.mm. - Vessel element mean length: >800um. - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: >1600um, - Wall thickness: very thick, AXIAL PARENCHYMA. - Aportracheal p.: diffuse, diffuse-in-aggregates,

RAYS - Width: commonly 4-10 seriate, - Numbers: >12/mm, - Ray tissues: heterogeneous type I, heterogeneous type II,
MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells. - crystalliferous cells: ordinary, chambered.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

	trees Moisture Dens ted content % Basic density		-	•	-
Philippines	12 0.74	0.887	121 111	13.6 12.6	65.8 60.8
	Hardness N. Side grain end grain				ce to splittiing N/cm
. 16.8 14.5	1160 1056 1350 17	229 . 15	.2 15.7		

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TRADE NAME: Kulim BOTANICAL NAME: Scorodocarpus borneensis Becc. (Olacaceae)

LOCAL NAME: Bawang hutan (Br, M., Sab., Sar.); ungsunah (Sar.); Bawan, Kasino, madudu, Sinduk (In.)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: red, purple, with streaks, - Odour: distinct,

- Grain: straight to fairly interlocked. - Texture: fine. - Weight: heavy. - Shrankage: small.

STRENGTH CLASSES: strong, medium.

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SEASONING - Air drying rates: moderately fast, - Checking: slight risk of checking, - Deformation:

NATURE DUARBILITY: durable, RESISTANCE TO TERMITES: moderately, AMENABILITY TO PRESERVATIVE TREATMENT: medium, WORKING QUALITIES: moderately difficult,

USES: House building, Interior finish, Durable timber, Ship and boat manufacturing,

GEOGRAPHIC DISTRIBUTION: Brunei, Malaysia, Indonesia,

GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,

- Perforation plates: simple, scalariform, Intervessel pits: opposite, opposite-scalariform,
- Vessel-ray pitting: large, rounded, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: >800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Fibres with helical thickening, - Mean length: >1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates.

RAYS - interconnected (fused) rays, - Width: 1-3 cells, - multiseriate portion(s) as wide as uniseriate, - Numbers: >12/mm,

- Ray tissues: heterogeneous type I, heterogeneous type II,

Locality of growth	No.of trees tested	Moisture content %	Densit Basic density	y g/cm3 Air-dry density	Bending strength	Modulus of elasticity GPa	Maximum crushingstrength MPa	
Malaysia	4	15.8	0.66	0.815	107 115	14.9 14.7	57.0 64.5	
Stress at proportionality	imit / MPa	Hard Side grain	dness N. end grain	Shear paral R	el to grain MPa	Resistanc R-Pl	e to splittiing N/cm ane T-plane	The state of the s
5::10	5.28 [5100 6246		10.	3 11.9	46	67	ender in de la company

TRADE NAME: Sawa luka BOTANICAL NAME: Heliciopsis montana Sleum (Proteaceae) LOCAL NAME: HABIT OF TREE: medium tree, large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, distinct, - Heartwood Color: brown. red. - Odour: indistinct. - Grain: straight, oblique. - Texture: coarse. - Weight: light. - Shrankage: . STRENGTH CLASSES: weak. SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation: NATURE DUARBILITY: non-durable. WORKING QUALITIES: easy. USES: House building, Interior finish, Furniture, Veneer, GEOGRAPHIC DISTRIBUTION: Malaysia. GROWTH RINGS: indistinct or absent, VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in tangential. - Perforation plates: simple, scalariform. - Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: >200. - Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered. - Mean length: >1600um. - Wall thickness: thin to thick. AXIAL PARENCHYMA - Banded: 1-3 cells. >3 cells. RAYS - rays of two distinct sizes. - Width: commonly >10 seriate. - Numbers: <4/mm. - Ray tissues: heterogeneous type III, - Sheath cells present,

Lo	ocality of growth	No.of trees tested	Moisture content % Ba	Densit sic density	y g/cm3 Air-dry density	Bending strength MPa	Modulus of N elasticity GPa	Maximum crushingstrength
_	1.		[11.5]					· .
<i>i</i>	Stress at l proportionality	imit MPa	Hardnes	end grain	Shear parale	l to grain MPa	•	to splittiing N/cm ne T-plane
					,			

PRODUCTION CONTRACTOR

TRADE NAME: Blakat

BOTANICAL NAME: Ziziphus talanai (Blornco) Merr. (Rhamnaceae)

LOCAL NAME:

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: brown, red. - Odour: indistinct.

- Grain: straight, - Texture: fine, - Weight: moderately heavy, - Shrankage:

Service Control of the STRENGTH CLASSES: medium,

SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: non-durable, WORKING QUALITIES: easy,

USES: House building, Furniture, Veneer, Plywood, Sporting goods,

GEOGRAPHIC DISTRIBUTION: Philippines.

GROWTH RINGS: moderately distinct, indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, - Intervessel pits: alternate,

- Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 100-200um,

- Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Paratracheal p.: aliform, confluent, - Banded: 1-3 cells, >3 cells,

RAYS - Width: exclusively uniseriate, - Numbers: >12/mm, - Ray tissues: heterogeneous uniseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: ordinary,

Locality of growth	•			•	Bending strength MPa	•	Maximum crushingstrength MPa
Philippines	1	12	0.56	0.659	104 95.3	11.8 10.9	49.5 45.7
Stress at proportionality				Shear parale R	el to grain MPa T		ce to splittiing N/cm lane T-plane
8.89	7.69	5610 5105	7660 .6971	12.9	713.3		

TRADE NAME: Delek BOTANICAL NAME: Anisophyllea griffithii Oliv. (Rhizophoraceae) LOCAL NAME: delek tembaga, Hampas kadah (M.); Mertama (Sar.)

HABIT OF TREE: medium tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: brown, red, - Odour: indistinct,
- Grain: straight. - Texture: medium. coarse. - Weight: heavy. - Shrankage: very large.

STRENGTH CLASSES: medium.

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation:

NATURE DUARBILITY: moderately durable, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately difficult,

USES: Interior finish, Furniture, Veneer, Household appliance. Tool handle.

nodsenota apptiance, root name

GEOGRAPHIC DISTRIBUTION: Malaysia,

GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: extremely rare or absent,
- Vessel-ray pitting: similar to intervessel pits. Mean T.D.: >200.
- Vessel No.: <5/sq.mm. Vessel element mean length: >800um. Gums and other deposits.

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: very thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: aliform, - Banded: >3 cells,

RAYS - rays of two distinct sizes, ·- Width: commonly 4-10 seriate, - Numbers: 4-12/mm,

- Ray tissues: heterogeneous type II,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary,

Locality of growth				y g/cm3 Air-dry density			Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia		58	0.75	0.895	79	82.3	16.90 16.45	42.8 46.5
Stress at l proportionality				Shear para R	lel to grain	MPa T		ce to splittiing. N/cm ane T-plane
	.			8.	9 10.1		1	·

TRADE NAME: Bakau BOTANICAL NAME: Bruquiera gymnorrhiza Lam. (Rhizophoraceae) LOCAL NAME: Burma mangrove (Bur.): Tumu merah (M.): Busaing, Pototan (Ph.): Pasak, Pang kahua sum (Th.); Mangrov (P.N.) HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Keartwood Color: red, - Odour: indistinct, - Grain: straight, oblique. - Texture: medium, coarse. - Weight: heavy. - Shrankage: very large. STRENGTH CLASSES: strong. SEASONING - Air drying rates: moderately slow. - Checking: - Deformation: NATURE DUARBILITY: moderately durable. AMENABILITY TO PRESERVATIVE TREATMENT: good, USES: House building, Durable timber, Household appliance, Tool handle, Fuel, Pulpwood, GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia. GROWTH RINGS: indistinct or absent, VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: scalariform, - Intervessel pits: scalariform, - Vessel-ray pitting: large, rounded, large, gash-like. - Mean T.D.: 50-100um. - Vessel No.: 20-40/sq.mm. - Vessel element mean length: >800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Septate fibres: present. - Mean length: >1600um. AXIAL PARENCHYMA - Paratracheal p.: scanty. RAYS - Width: commonly 4-10 seriate. - Numbers: 4-12/mm. - Ray tissues: heterogeneous type II. heterogeneous type III. MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary,

Locality of growth No.of trees tested	Moisture Densi content % Basic density				Maximum crushingstrength MPa
					I
Stress at limit proportionality MPa		,	el to grain MPa		ce to splittiing N/cm lane T-plane
				.	

LOCAL NAME: Putat hutan(Sab.): Ringgit darach, Bara(In.); Kerakas, Payau(Br.): Bakauan gubat(Ph.); Chiangprar(Th.); Rabong(Sar.); Carallia wood(Ind.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. : - Heartwood Color: yellow, brown. - Odour: indistinct. - Grain: straight, oblique, - Texture: coarse, - Weight: heavy, - Shrankage: very large. STRENGTH CLASSES: strong, medium, SEASONING - Air drying rates: moderately slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: moderately durable. WORKING QUALITIES: moderately easy. USES: House building, Interior finish, Durable timber, Furniture, Veneer, GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Philippines, Indonesia, China, India, Sri Lanka, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present, - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm, - Vessel element mean length: >800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered. - Mean length: >1600um. - Wall thickness: very thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse. - Paratracheal p.: aliform. confluent. - Banded: 1-3 cells.

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary, chambered,

ROTANICAL NAME: Carallia brachiata (Lour.) Merr. (Rhizophoraceae)

RAYS - rays of two distinct sizes, - Width: commonly >10 seriate, - Numbers: 4-12/mm, >12/mm, - Ray tissues: heterogeneous type I. heterogeneous type II. - Sheath cells present.

TRADE NAME: Meransi

Locality of g		s Moisture Densi content % Basic density			Modulus of Maximum crushingstrength elasticity GPa MPa
China	ļ	0.74	0.87	124.5	16.82 65.6
	ss at limit onality MPa	Mardness N. Side grain end grain	Shear paral	el to grain MPa	Resistance to splittiing N/cm R-Plane T-plane
	1		1		.1

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BOTANICAL NAME: Combretocarpus rotundatus Dans. (Rhizophoraceae)
TRADE NAME: Keruntum
LOCAL NAME: Perepat paya (Sab.): Perepat darat (In.)
HABIT OF TREE: large tree,
PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, indistinct, - Heartwood Color: brown, red. - Odour:
                     - Grain: straight, oblique. - Texture: medium, coarse. - Weight: moderately heavy, heavy. - Shrankage: small, comparatively large.
STRENGTH CLASSES: medium.
SEASONING - Air drying rates: slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation.
NATURE DUARBILITY: durable, moderately durable. AMENABILITY TO PRESERVATIVE TREATMENT: medium.
                                                                                                   WORKING QUALITIES: moderately easy.
USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Plywood.
      Agricultural implement wood, Fuel,
GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia,
GROWTH RINGS: indistinct or absent.
VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,
               - Vessel grouping: exclusively solitary, - Perforation plates: simple, - Intervessel pits: extremely rare or absent,
               - Vessel-ray pitting: large, rounded, large, gash-like. - Mean T.D.: >200,
               - Vessel No.: <5/sq.mm. - Vessel element mean length: 350-800um, - Tyloses: present, Gums and other deposits.
FIBRES AND FIBRE TRACKEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: very thick,
AXIAL PARENCHYMA - Banded: 1-3 cells, >3 cells,
RAYS - aggregate rays common, rays of two distinct sizes, - Width: commonly 4-10 seriate, - Numbers: 4-12/mm.
       - Ray tissues: heterogeneous type II, - Sheath cells present,
MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells. - crystalliferous cells: chambered.
```

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Locality of growt	•	•	Density g/cm3 c density Air-dry de		•	Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia	[-	15	0.81	103	107.3	14.1 13.69	50 54.3
Stress at	limit ty MPa	Hardness Side grain e		paralel to grain	MPa T		ce to splittiing N/cm lane T-plane
not un	.		ļ	9.0 10.2			

TRADE NAME: Bakau	BOTANICAL N	AME: Rhizopho	ra mucronata P	oir. (Rhizophor	aceae)			: 1	r 3 .			. Tali 2 de 60
LOCAL NAME: Bakau kui	rap (Sab. Br.	Sar.); Dang (Viet.); Kong k	ang (Cam.); Oṗe	jo (In.);	Bakauan baba	ae (Ph.);	Lenggayon	g (Sari); N	langrove(P. N.) · · · · · · · · · ·	in the property
HABIT OF TREE: medium	n tree,		•									Jan Breed BAR
PHYSICAL PROPERTIES	- Heartwood a	nd Sapwood: i	ndistinct,	Heartwood Colo	r: yello	, brown, -	Odour: i	indistinct,	*	1 1 1 1 1 1 1 1 1	7.1	एक्टबर्ग अस्ति अस्ति।
. •	- Grain: stra	ight, - T.ex	ture: fine,	- Weight: very	heavy,	- Shrankage:	comparat	tively large	e, :	·saga a sara		
STRENGTH CLASSES: ver	ry strong,								•			ि ५० मध्युक्तार
SEASONING - Air dry	ing rates: -	Checking: sl	ight risk of c	hecking, - De	formation	n: slight rish	k of defe	ormation,		er e e		
NATURE DUARBILITY: mx	oderately dura	ble, WORK	ING QUALITIES:	moderately diff	icult,			***	. ::			1, 1915 1 9 9, 3
USES: House building	, Durable timb	er,		•	•				• • • • • • • •			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Household appl	•	-	Pulpwood,				•					141 - 4
GEOGRAPHIC DISTRIBUT				ines, Indonesia	. Papua I	lew Guinea,						agi alikat webi
GROWTH RINGS: indist		•		•	• •	•				$(x,y) = (x,y)^{-1} \cdot (y)$	$(20.3 \pm 2.2 \pm 2.2.3 \pm 4.2)$	43534E 3AV89
VESSELS/PORES - Por		•	, - Arrangeme	ent: in diffuse,	, .				•	·	vary Stock	1997 N. H. H. H. W. W.
				essel pits: scal					٠		: • • • • • •	
•	•			gash-like, - M								
	- •		•	nean length: 350		-	resent,				• • • •	
FIBRES AND FIBRE TRA		•				•			very thic	k,		1 1 1 1 1 A 4 - 1
AXIAL PARENCHYMA - P		' - '	• • •	•	•		•			•		الكلمقي لأقيموا فراان
RAYS - Width: commo	•		rs: 4-12/mm, -	- Ray tissues: h	neterogen	eous multiser	iate, he	terogeneous	type III,			in the state
MINERAL INCLUSIONS -	Crystals: Pr	ismatic cryst	als present, in	n axial parenchy	yma cells	, - crystal	liferous	cells: ord	linary,	e de la companya de l	**********	11 7 10 7
.•			,	•	•	•					12.3	. Ott. (A 944)
		,	TABLE OF PHYSIC	CAL AND MECHANIC	CAL PROPE	RTIES						
Locality of growth	No.of trees	Moisture	Densi	ty g/cm3	Bend	ing strength	Modu	lus of	Maximum cr	ushingstrengt		• • • • •
1	tested	content %	Basic density.	Air-dry densi	ty	MPa	elasti	city GPa		MPa		g la towell
1					1			. [
												41 - 741
Stress at li	imit	Hardn	ess N.	Shear pa	ralel to	grain MPa	. [Resistance	to splitt	iing N/cm		
proportionality	MPa	Side grain	end grain	R	. [, T	. i	R-Pla	ane T	-plane		* *.
									·			14 14 17
•	. 1						. [
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	•											

BOTANICAL NAME: Parastemon urophyllus A. Dc. (Rosaceae) TRADE NAME: Malas LOCAL NAME: Ngilas (M.); Tampaluan, Mendailas (Sab.); Bebuan, mangilas, Kaju malas (In.); Sempalawan (Br.) HABIT OF TREE: medium tree, large tree, PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. - Heartwood Color: red. purple. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: fine. - Weight: yery heavy. - Shrankage: comparatively large. STRENGTH CLASSES: strong. SEASONING - Air drying rates: moderately slow. - Checking: - Deformation: slight risk of deformation WORKING QUALITIES: very difficult. NATURE DUARBILITY: durable. USES: House building, Durable timber, Ship and boat manufacturing, Sporting goods, . Agricultural implement wood. GEOGRAPHIC DISTRIBUTION: Malaysia, Indonésia. GROWTH RINGS: moderately distinct, indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Vessel grouping: exclusively solitary. - Perforation plates: - Intervessel pits: alternate. - Vessel-ray pitting: large, rounded, large, gash-like, .- Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm, - Vessel element mean length: >800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse-in-aggregates, - Banded: 1-3 cells, RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III. MINERAL INCLUSIONS - Silica: present in ray cells,

Proceedings and

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Locality of growth	No.of trees -ftested	Moisture content % B	Densit asic density	y g/cm³ Air-dry density	Bending st MPa	rength	Modulus elasticity	of Ma	aximum crushingstrength
Malaysia] 3.	18.2	0.84	1.075	130	153	21.1	21.5	67.0 84.5
	limit			Shear paral			Res		to splittiing N/cm e T-plane
	1	2240 13415		16.	1 20.0		Ī	44	66

TRADE NAME: Merbatu BOTANICAL NAME: Parinari corymbosum Miq. (Rosaceae)

LOCAL NAME: Bankawang (Sab.); Liusin (Ph.); Bone, Donge, Joesoekadoja, Kalake, Kolasa (In.)

HABIT OF TREE: medium tree, large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: brown, red. - Odour: indistinct.

- Grain: straight, oblique, - Texture: medium, - Weight: very heavy, - Shrankage: very large,

STRENGTH CLASSES: very strong.

SEASONING - Air drying rates: moderately fast, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: moderately durable. AMENABILITY TO PRESERVATIVE TREATMENT: good. WORKING QUALITIES: difficult.

USES: House building, Durable timber,

Fuel.

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GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia,

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,

- Vessel grouping: exclusively solitary, Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: >200.
- Vessel No.: <5/sq.mm, Vessel element mean length: >800um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: very thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Banded: 1-3 cells,

RAYS - Width: exclusively uniseriate, 1-3 cells, - Numbers: >12/mm, - Ray tissues: heterogeneous uniseriate, heterogeneous type III,

MINERAL INCLUSIONS - Silica: present in ray cells,

Locality of growth	•	•		y g/cm3 Air-dry density	, -	Modulus of lelasticity GP	Maximum crushingstrength a
Philippines	3	12	0.79	1.000	155 142	20.8 19.	3 80.0 73.9
<pre>% " Stress at l proportionality</pre>			dness N.	Shear paral R	el to grain MPa		ance to splittiing N/cm -Plane T-plane
15.7	13.6	11900 1082	9 13000 1183	50 14.	2 14.7	1	

TRADE NAME: Xoan-dao BOTANICAL NAME: Pygeum arboreum Engl. (Rosaceae)

LOCAL NAME: Xuan-dao (Viet.)

MABIT OF TREE: medium tree, large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: brown, red, - Odour: indistinct,

- Grain: oblique, straight to fairly interlocked, - Texture: fine, - Weight: light, moderately heavy, - Shrankage: large,

M. Holling Section

STRENGTH CLASSES: medium, weak,

SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: non-durable, WORKING QUALITIES: easy,

USES: House building, Interior finish, Furniture, Plywood,

GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia,

GROWTH RINGS: moderately distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, vasicentric,

RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III,

Locality of growth No.of trees tested	Moisture Densit				
Indo-china	12	0.435	63.9 63.9	43	.1 39.8
Stress at limit proportionality MPa		•	el to grain MPa		splittiing N/cm T-plane
1					

TRADE NAME: Kwan BOTANICAL NAME: Adina cordifolia Hook, f. (Rubiaceae) LOCAL NAME: Gao yang (Viet.): Haldu (In. Th.): Hnaw (Bur.): Kvao (Cam.): kolon (S.l.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow, brown, - Odour: indistinct, - Grain: straight to fairly interlocked. - Texture: very fine. - Weight: moderately heavy, heavy, - Shrankage: large. STRENGTH CLASSES: strong, medium. SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: moderately durable. RESISTANCE TO TERMITES: no. AMENABILITY TO PRESERVATIVE TREATMENT: medium. WORKING QUALITIES: moderately easy, USES: House building. Ship and boat manufacturing, Furniture, Veneer, Plywood, Sporting goods, Musical instruments Food containers, Turnery wood, Carvinge, GEOGRAPHIC DISTRIBUTION: Vietnam, Laos, Cambodia, Burma, Thailand, GROWTH RINGS: moderately distinct, VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse, - Vessel grouping: exclusively solitary, - Perforation plates: simple, - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 50-100um. - Vessel No.: 40-100/sq.mm, - Vessel element mean length: >800um, FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered. - Mean length: 900-1600um. - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: >12/mm, - Ray tissues: heterogeneous type I.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth	No.of trees tested	Moisture Dens content % Basic density	ity g/cm3 Air-dry density	Bending strength MPa	Modulus of elasticity GPa	Maximum crushingstrength . MPa
Malaysia		14.6	0.758	83.9 86.0	9.215 8.9	41.47 44.2
•	•	Kardness N. Side grain ∣ end grain	Shear para R	lel to grain MPa	:	ce to splittiing N/cm lane T-plane
			ļ 8	9.5		

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TRADE NAME: Kadam BOTANICAL NAME: Anthocephalus chinensis Rich of Walp (Rubiaceae)

LOCAL NAME: Laran(M.); Gao(Viet.); Kelampajan(In.); Kaatoan bankal(Ph.); Sempayang(Sar.); Ludai(Sab.); Mao-Lettanshe(Bur.); Entipong(Br.) Thkeou(Cam.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: white to grey, yellow, - Odour: indistinct,

- Grain: straight, '- Texture: fine, - Weight: light, - Shrankage: very small,

STRENGTH CLASSES: weak,

SEASONING - Air drying rates: moderately fast, - Checking: no risk of checking, - Deformation: no risk of deformation,

NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no, AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: easy,

USES: Interior finish, Furniture, Veneer, Plywood,

Food containers, Wood mould, Household appliance, Pencils, Pulpwood, Disposable chopsticks etc.,

GEOGRAPHIC DISTRIBUTION: Vietnam, Laos, Cambodia, Burma, Thailand, Malaysia, Philippines, Indonesia, China, India, Sri Lanka, Nepal,

GROWTH RINGS: moderately distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,

- Perforation plates: simple, Intervessel pits: alternate, vestured pits present,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: >800um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty,

- RAYS interconnected (fused) rays, Width: 1-3 cells, multiseriate portion(s) as wide as uniseriate, Numbers: >12/mm,
 - Ray tissues: heterogeneous type I,

47.3 3 77.

Locality of growth	•	•			Bending strength		Maximum crushingstrength MPa
Philippines] 3	12	0.34	0.398	53.6 53.6	5.86 5.04	24.5 22.6
Stress at l	imit . MPa			•	el to grain MPa		ce to splittiing N/cm lane T-plane
3.96 3	.43	2140 1947	3330 3030	6.2	4 6.45		

TRADE NAME: Kuthan BOTANICAL NAME: Hymenodictyon excelsum Wall. (Rubiaceae) LOCAL NAME: Ooloke, Ulok (Th.): Tai-nghe (Viet.): Aligango (Ph.): medang keladi (M.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: white to grey, yellow. - Odour: indistinct. - Grain: straight, - Texture: medium, - Weight: Light, - Shrankage: STRENGTH CLASSES: weak. SEASONING - Air drying rates: - Checking: no risk of checking. - Deformation: no risk of deformation. NATURE DUARBILITY: non-durable. AMENABILITY TO PRESERVATIVE TREATMENT: medium, WORKING QUALITIES: easy, USES: Furniture, Wood based panel, Cooperage, Matches, GEOGRAPHIC DISTRIBUTION: Burma, Thailand, Malaysia, Philippines, China, India, GROWTH RINGS: moderately distinct. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: >200. - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, · FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Septate fibres: present, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, - Banded: 1-3 cells, RAYS - Width: 1-3 cells. - multiseriate portion(s) as wide as uniseriate. - Numbers: >12/mm. - Ray tissues: heterogeneous type I, heterogeneous type II,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth No.of trees tested	Moisture Densit content % Basic density				
Stress at limit		: Shear paral	el to grain MPa	 Resistan	ce to splittiing N/cm
proportionality MPa	Side grain end grain	R	[]	R-P	lane T-plane

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- Ray tissues: heterogeneous type II,

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BOTANICAL NAME: Mitragyna rotundifolia (Roxb.) O. Kuntze (Rubiaceae)
TRADE NAME: Binga
LOCAL NAME: Mimbog (Ph.): Kutum (M.)
HABIT OF TREE: medium tree;
PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: white to grey, yellow, - Odour: indistinct,
                    - Grain: straight to fairly interlocked, - Texture: fine, - Weight: moderately heavy, - Shrankage: very large,
STRENGTH CLASSES: medium.
SEASONING - Air drying rates: - Checking: - Deformation:
NATURE DUARBILITY: WORKING QUALITIES: easy,
USES: House building, Interior finish, Textile timber.
      Household appliance,
GEOGRAPHIC DISTRIBUTION: Burma, Philippines, India,
GROWTH RINGS: moderately distinct.
VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern, in diffuse.
               - Perforation plates: simple. - Intervessel pits: alternate, - vestured pits present.
               - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um,
               - Vessel No.: 5-20/sg.mm, 20-40/sg.mm, - Vessel element mean length: 350-800um,
FIBRES AND FIBRE TRACKEIDS - Pits: distinct bordered. - Mean length: 900-1600um. - Wall thickness: thin to thick.
AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, - Banded: 1-3 cells,
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- TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

RAYS - interconnected (fused) rays, - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, >12/mm,

.,	h No.of tree	s Moisture Dens content % Basic density	sity g/cm3	Bending strength	Modulus of elasticity GPa	Maximum crushingstrength MPa
India	Re	12.8.	0.753	96.8 92.0	11.06 10.38	51.9 50.2
		Hardness N. Side grain end grain			R-P	ce to splittiing N/cm lane T-plane
	1		10	.0 10.6		

TRADE NAME: Malabira bukit BOTANICAL NAME: Mussaendopsis becariana Baill. (Rubiaceae) LOCAL NAME: Mempedal babi (M.); Kaju patin, Selumar (In.). HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: yellow. - Odour: - Grain: straight, oblique, - Texture: fine, - Weight: heavy, very heavy, - Shrankage: very large, STRENGTH CLASSES: very strong, strong, SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: durable. RESISTANCE TO TERMITES: no. WORKING QUALITIES: moderately difficult. USES: House building, Durable timber, Agricultural implement wood. GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse. - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present. - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sq.mm. - Vessel element mean length: >800um. FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Septate fibres: present, - Mean length: >1600um, - Wall thickness: thin to thick, very thick, AXIAL PARENCHYMA - Paratracheal p.: scanty. RAYS - interconnected (fused) rays, - Width: - Numbers: 4-12/mm, >12/mm,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

- Ray tissues: heterogeneous type I, heterogeneous type II,

	th No.of trees	s Moisture Densit content % Basic density	y g/cm3	Bending strength	Modulus of	
Indonesia		16.1	1.093	127.9 139.1	17.26 17.03	70.7 81.1
	•	Hardness N. Side grain end grain	Shear parale	-		e to splittiing N/cm ane T-plane
]		1			

TRADE NAME: Bangkal BOTANICAL NAME: Nauclea orientalis L. (Rubiaceae) and the state of t LOCAL NAME: Bengkal, Gempol (In.) HABIT OF TREE: large tree, PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: fine. - Weight: moderately heavy. - Shrankage: STRENGTH CLASSES: medium. SEASONING - Air drying rates: - Checking: no risk of checking. - Deformation: slight risk of deformation. The second section is a second NATURE DUARBILITY: moderately durable, WORKING QUALITIES: easy, CARLOR WITH THE CONTRACTOR USES: House building, Furniture, Committee of the commit Carvinge. to some of the history. GEOGRAPHIC DISTRIBUTION: Philippines, Indonesia, China, The state of the s GROWTH RINGS: moderately distinct, indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern. - Perforation plates: simple. - Intervessel pits: alternate. - vestured pits present. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: 5-20/sg.mm, - Vessel element mean length: >800um, FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, RAYS - interconnected (fused) rays, - Width: 1-3 cells, - multiseriate portion(s) as wide as uniseriate, - Numbers: >12/mm, - Ray tissues: heterogeneous type 1, TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth No.of trees tested	Moisture Densit					
65				1	The state of	g a sakena rea
Stress at limit proportionality MPa	Hardness N. Side grain ∣ end grain	Shear paral	el to grain MPa	Resistan	nce to splittiing N/cm lane T-plane	e la compensation de la compensa
are		1				

BOTANICAL NAME: Euodia glabra Bl. (Rutaceae) TRADE NAME: Sampang LOCAL NAME: Pepauh (M.) HABIT OF TREE: small tree, medium tree, PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: white to grey, yellow. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: fine. - Weight: very light. - Shrankage: small, STRENGTH CLASSES: weak. SEASONING - Air drying rates: moderately fast. - Checking: no risk of checking. - Deformation: no risk of deformation. WORKING QUALITIES: easy, NATURE DUARBILITY: non-durable. USES: Interior finish, Plywood, Packing boxes, Wood mould, Carvinge, GEOGRAPHIC DISTRIBUTION: Malaysia. GROWIN RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse, - Perforation plates: simple, - Intervessel pits: alternate, - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits, FIRRES AND FIRRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: 900-1600um. - Wall thickness: very thin. AXIAL PARENCHYMA - Paratracheal p.: aliform. confluent. - Banded: 1-3 cells, >3 cells, RAYS - interconnected (fused) rays. - Width: 1-3 cells. - Numbers: 4-12/mm. - Ray tissues: homogeneous uniseriate and multiseriate, heterogeneous type III, MINERAL INCLUSIONS - Silica: present in ray cells,

Locality of growth No.of trees tested	Moisture Densit content % Basic density			
			 Resistanc	e to splittiing N/cm
proportionality MPa		R		ane T-plane

TRADE NAME: Hantu Duri BOTANICAL NAME: Zanthoxlum rhetsa Dc. (Rutaceae)
LOCAL NAME: Chenkring (M.); Kaju tanah (In.); Kaitana (Ph.); Juminina, Rhetsa (Ind.)

HABIT OF TREE: small tree: medium tree.

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PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow. - Odour: indistinct.

- Grain: straight, wavy. - Texture: fine. - Weight: very light, - Shrankage: comparatively large,

STRENGTH CLASSES: very weak.

SEASONING - Air drying rates: - Checking: no risk of checking, - Deformation: no risk of deformation,

NATURE DUARBILITY: durable, WORKING QUALITIES: easy,

USES: Furniture.

Packing boxes, Novelties,

GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, India.

GROWTH RINGS: distinct.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple. Intervessel pits: alternate.
- Vessel-ray pitting: similar to intervessel pits. Mean T.D.: 100-200um.
- Vessel No.: 5-20/sq.mm, Vessel element mean length:

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: - Wall thickness: very thin,

AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: scanty,

RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, - Ray tissues: homogeneous uniseriate and multiseriate, heterogeneous type III, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

Locality of growth No.of tes	trees Moisture ted content %				•	Maximum crushingstrength MPa
Philippines 10-1	12	0.33	0.387	58.2 58.2	8.05 6.93	28.7 26.5
Stress at limit proportionality MPa			Shear paralo			nce to splittiing N/cm Plane T-plane
3.15 2.72	1680 1529	2670 2430	5.4	3 5.62	l	

GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern,

- Vessel grouping: radial multiple, . - Perforation plates: simple, scalariform, - Intervessel pits: alternate,

WORKING QUALITIES: moderately easy.

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- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, 20-40/sq.mm, Vessel element mean length: >800um, Tyloses: present,

FIBRES AND FIBRE TRACKEIDS - Pits: distinct bordered, - Septate fibres: common, - Mean length: >1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - absent or extremely rare,

- RAYS interconnected (fused) rays, Width: 1-3 cells, multiseriate portion(s) as wide as uniseriate, Numbers: >12/mm,
 - Ray tissues: heterogeneous type I, heterogeneous type II,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells,

Locality of growth								Modulus of elasticity GPa		
Indo-china	1	14.6	ų.	0.942	1	118.6	121,6		56.1	59.8
Stress at proportionali	limit ty MPa	. Hardno Side grain	ess N. end grain	Shear R	paralel t	o grain	MPa T	Resistan	ce to splittiing lane T-pl	
	l	•	. , 	7.7	8.5	8.6	9.5	1	,	

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TRADE NAME: Burma lancewood BOTANICAL NAME: Homalium tomentosum Benth. (Samydaceae) LOCAL NAME: Lance wood, Myaukchaw (Bur.); Delingsem (In.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: brown, red. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: very fine. - Weight: very heavy. - Shrankage: STRENGTH CLASSES: strong. SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: moderately durable. RESISTANCE TO TERMITES: moderately. WORKING QUALITIES: moderately easy. USES: House building, Interior finish, Durable timber. Ship and boat manufacturing, Vehicle, Furniture, Sporting goods. Agricultural implement wood, Bedding wood material, GEOGRAPHIC DISTRIBUTION: Burma, Thailand, Indonesia. GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern. - Vessel grouping: radial multiple. - Perforation plates: simple, scalariform. - Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 50-100um. - Vessel No.: 20-40/sg.mm. - Vessel element mean length: - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered. - Mean length: - Wall thickness: very thick. AXIAL PARENCHYMA - absent or extremely rare. RAYS - interconnected (fused) rays, - Width: commonly 4-10 seriate, - multiseriate portion(s) as wide as uniseriate, - Numbers: >12/mm.

- Ray tissues: heterogeneous type I, heterogeneous type II,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells,

Locality of growth No.	of trees tested	Moisture content % Ba	Densit sic density	y g/	cm3 -dry der	nsity	Bending st	rength	Modulu: elastici	of ty GPa	Maximum	crushingstr MPa	ength
Indonesia	· · · · · · · · · · · · · · · · · · ·	13.7			1.099	1	129.7	128.1	14.31	13.6	67.5	68.6	
Stress at limit proportionality M	1.	: : Hardnes	ss N.	1	Shear	parale	l to grain	MPa	. R	esistanc	e to spl	ittiing N/	
) () :	j.			1	9.8	10.5	10.7	11.5	l			: :	

TRADE NAME: Mangir BOTANICAL NAME: Ganophyllum obliquum (Blanco) Merr.(Sapindaceae)
LOCAL NAME: Anamea. Konawe. Marasoelo (In.): Arangen (Ph.): Scaly ash (P. N.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: yellow, brown, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: fine, - Weight: heavy, - Shrankage: large,

STRENGTH CLASSES: medium,

SEASONING - Air drying rates: - Checking: - Deformation:

NATURE DUARBILITY: durable, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately difficult,

USES: House building, Durable timber, Ship and boat manufacturing, Vehicle, Sporting goods,

Agricultural implement wood, Turnery wood,

GEOGRAPHIC DISTRIBUTION: Philippines, Indonesia, Papua New Guinea,

GROWIH RINGS: moderately distinct, indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,

- Perforation plates: simple. Intervessel pits: alternate.
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm. 20-40/sq.mm. Vessel element mean length: 350-800um. Gums and other deposits.

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: scanty, vasicentric, aliform, confluent,

- RAYS interconnected (fused) rays, Width: 1-3 cells, Numbers: >12/mm,
 - Ray tissues: homogeneous uniseriate and multiseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered, MISCELLANEOUS: Rays storied.

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth		Moisture Densit content % Basic density	ty g/cm3				
indonesia	1	12.6 ()	0.923	88.4	83.2	12.55 11.74	57.8 55.3
	•	Hardness N. Side grain end grain	•			•	ce to splittiing N/cm lane T-plane
	[11.9 1	2.5 12.5	13.2		

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TRADE NAME: Uas BOTANICAL NAME: Harpullia arborea (Blanco) Radlk (Sapindaceae)

HABIT OF TREE: medium tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: vellow, brown. - Odour: indistinct.

- Grain: straight, wavy. - Texture: fine. - Weight: moderately heavy. - Shrankage: small.

4.

STRENGTH CLASSES: medium, weak.

SEASONING - Air drying rates: - Checking: - Deformation:

NATURE DUARBILITY: WORKING QUALITIES: easy,

USES: House building, Furniture, Plywood,

Packing boxes,

GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, India,

GROWIN RINGS: moderately distinct.

VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse.

- Perforation plates: simple. Intervessel pits: alternate.
- Vessel-ray pitting: similar to intervessel pits. Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: <900um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: scanty, vasicentric, aliform, confluent,

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, >12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth			•			Bending strength MPa	•	Maximum crushingstrength MPa
Philippines	1		12	0.60	0.693	98.0 : - 89:8-"	10.6 9.83	46.2
				• • •	•	el to grain MPa	•	e to splittiing N/cm ane T-plane
10.0	8.65	58	370 5342	8480 7717	13.	4 : 13.9		

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TRADE NAME: Kasai BOTANICAL NAME: Pometia pinnata Forst. (Sapindaceae) LOCAL NAME: Truong (Viet): Matoa(In.): Taun (P.N.); Malugai (Ph.); Toun, Kasai besar daun, Lan doeng (In.); Sibu (Sar.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: red. - Odour: indistinct. - Grain: straight to fairly interlocked, - Texture: fine. - Weight: moderately heavy. - Shrankage: large. STRENGTH CLASSES: medium. SEASONING - Air drying rates: moderately slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation. NATURE DUARBILITY: durable, moderately durable. AMENABILITY TO PRESERVATIVE TREATMENT: low. WORKING QUALITIES: moderately easy. USES: House building, Interior finish, Ship and boat manufacturing, Vehicle, Textile timber, Furniture, Sporting goods, Culture, Agricultural implement wood, Packing boxes, Turnery wood, Tool handle, Bent wood, Pulpwood, GEOGRAPHIC DISTRIBUTION: Vietnam, Malaysia, Philippines, Indonesia, Indo-china, Papua New Guinea, China, India, Sri Lanka, GROWTH RINGS: moderately distinct. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple. - Intervessel pits: alternate.

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- Vessel-ray pitting: similar to intervessel pits. Mean T.D.: 100-200um.
- Vessel No.: <5/sq.mm. Vessel element mean length: 350-800um. Gums and other deposits.

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: vasicentric, aliform,

RAYS - Width: exclusively uniseriate, - Numbers: 4-12/mm, >12/mm, - Ray tissues: heterogeneous uniseriate,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells; ordinary, chambered.

Locality of growth N			Bending strength density MPa		
Philippines	5 12	0.56 0.682	2 104 95.3	12.8 11.9 5	2.4 48.4
proportionality	MPa Side grain	end grain.	ar paralel to grain MPa	Resistance to R-Plane	•
) 5380 4896	7040 6406	, 12.6 13.0	· 1	

TRADE NAME: Kusambi BOTANICAL NAME: Schleichera trijuga Willd. (Sapindaceae) LOCAL NAME: Kesambi (In.): Celon-oak (S. L.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: red. - Odour: indistinct. - Grain: interlocked. - Texture: fine. - Weight: heavy. - Shrankage: STRENGTH CLASSES: very strong, strong, SEASONING - Air drying rates: slow. - Checking: slight risk of checking. - Deformation: no risk of deformation, NATURE DÚARBILITY: non-durable, RESISTANCE TO TERMITES: moderately. WORKING QUALITIES: difficult. USES: House building, Ship and boat manufacturing, Vehicle, Musical instruments, Agricultural implement wood, Tool handle, Oil press, Bedding wood material, GEOGRAPHIC DISTRIBUTION: Burma, Malaysia, Philippines, Indonesia, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: 5-20/sq.mm. - Vessel element mean length: 350-800um, Gums and other deposits. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits; - Mean length: 900-1600um, - Wall thickness: very thick. The second of th AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Paratracheal p.: scanty, State of the second of the sec RAYS - interconnected (fused) rays. - Width: 1-3 cells. - Numbers: >12/mm. The second of th - Ray tissues: homogeneous uniseriate and multiseriate. MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: chambered,

Locality of growth No.of trees tested		ty g/cm3 Bending str Air-dry density MPa		
	1 .	1	1	1
		Shear paralel to grain		ance to splittiing N/cm -Plane T-plane
20 2 Ca		1		

- Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um,

- Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick,

TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Banded: 1-3 cells, RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: >12/mm,

- Ray tissues: heterogeneous type II,

MINERAL INCLUSIONS - Silica: present in ray cells, present In axial parenchma cells,

Locality of growth	No.of trees	Moisture Density	g/cm3	Bending strength	Modulus of; Maximum crushingstrength elasticity GPa MPa
Indonesia		15.8	1.015	105.4 113.3	10.00 9.83 54.0 61.0
Stress at proportionalit	limit y MPa	Hardness N. Side grain end grain	Shear parale R	l to grain MPa	Resistance to splittiing N/cm R-Plane T-plane
	Į.		9.8 10.3	11.4 12.0)

TRADE NAME: Bitis BOTANICAL NAME: Madhuca utilis H. J. Lam (Sapotaceae)

HABIT OF TREE: large tree.

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PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: red, purple, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: fine, - Weight: very heavy, - Shrankage: very large,

STRENGTH CLASSES: very strong,

SEASONING - Air drying rates: slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: very duarble, RESISTANCE TO TERMITES: moderately, AMENABILITY TO PRESERVATIVE TREATMENT: low,

USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, Sporting goods,

Agricultural implement wood, Tool handle, Bedding wood material,

GEOGRAPHIC DISTRIBUTION: Malaysia,
GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern,

- Vessel grouping: radial multiple. Perforation plates: simple. Intervessel pits: alternate.
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sg.mm. Vessel element mean length: 350-800um. Tyloses: present.

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: very thick, TRACHEIDS: vasicentric. AXIAL PARENCHYMA - Banded: 1-3 cells.

RAYS - Width: exclusively uniseriate, - Numbers: >12/mm, - Ray tissues: heterogeneous uniseriate,

MINERAL INCLUSIONS - Silica: present in ray cells,

Locality of growth	No.of trees tested	Moisture content %	Densi Basic density	ty g/cm³ Air-dry density	Bending strength MPa	Modulus of elasticity GPa	Maximum crushingstrength MPa	1.01
Malaysia	5	14.0	0.92	1.120	171 171	23.8 22.7	90.3 93.3	
Stress at l proportionality	imit		iness.N.		el to grain MPa		ce to splittiing N/cm lane T-plane	 ::- .::
12.48 1	1.92 1	4860 14414	·	15	4 16.9	86	67	

TRADE NAME: Sawokecik BOTANICAL NAME: Manilkara kauki Dubard (Sapotaceae) LOCAL NAME: Sawo ketjik, Natoe (In.); Sawu djawa (Ja.); timbuwalo, Komea (cel.); Sawai (Ph.) HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: brown, red. - Odour: indistinct, - Grain: straight to fairly interlocked, - Texture: very fine, - Weight: heavy, - Shrankage: STRENGTH CLASSES: strong; SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: durable. WORKING QUALITIES: moderately easy. USES: House building, Furniture, Culture, Turnery wood, Carvinge, Tool handle, GEOGRAPHIC DISTRIBUTION: Burma, Malaysia, Philippines, Indonesia, India, GROWIN RINGS: moderately distinct. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern. - Perforation plates: simple, - Intervessel pits: alternate, - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 50-100um, - Vessel No.: 20-40/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse-in-aggregates, - Banded: 1-3 cells, RAYS - interconnected (fused) rays, - Width: 1-3 cells, - multiseriate portion(s) as wide as uniseriate, - Numbers: >12/mm, - Ray tissues: heterogeneous type I, heterogeneous type II, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered. Locality of growth | No. of trees | Moisture | Density g/cm3 | Bending strength | Modulus of | Maximum crushingstrength elasticity GPa tested | content % | Basic density | Air-dry density | MPa Hardness N. | Shear paralel to grain MPa | Resistance to splitting N/cm Stress at limit Side grain | end grain | proportionality MPa

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Section 1

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A STATE TORK LANGE TRADE NAME: Kirakuli BOTANICAL NAME: Manikara hexandra Dubard (Sapotaceae) LOCAL NAME: Khir (Ind.): Kes (Cam.): Ket (Th.) HABIT OF TREE: large tree. 15 (15 CH) 13 (15 CH) 15 (15 CH) PHYSICAL PROPERTIES - Heartwood and Sapyood: clearly distinct, - Heartwood Color: red, purple, - Odour: indistinct, - Grain: straight to fairly interlocked. - Texture: very fine. - Weight: very heavy. - Shrankage: STRENGTH CLASSES: very strong. L. 100 (17) 14 SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation: slight risk of deformation. The second section is the second section of the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the section is the second section in the section is the section in the section is the section in the section is the section in the section is the section in the section in the section is the section in the section is the section in the section is the section in the section is the section in the section is the section in the section is the section in the section is the section in the section is the section in the section is the section in the section is the section in the WORKING QUALITIES: difficult. NATURE DUARBILITY: very duarble. The second of the second of the second USES: House building, Durable timber, Vehicle, Agricultural implement wood. Tool handle. Oil press. Fuel. Bedding wood material. GEOGRAPHIC DISTRIBUTION: Cambodia, Thailand, India, Sri Lanka, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, - Vessel grouping: radial multiple, - Perforation plates: simple, - Intervessel pits: alternate. - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 50-100um, - Vessel No.: 5-20/sq.mm, 20-40/sq.mm, - Vessel element mean length: 350-800um. - Tyloses: present. FIBRES AND FIBRE TRACKEIDS - Pits: simple to minutely bordered pits. - Mean length: 900-1600um, - Wall thickness: very thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Banded: 1-3 cells. RAYS - Width: 1-3 cells, - multiseriate portion(s) as wide as uniseriate, - Numbers: 4-12/mm. >12/mm. - Ray tissues: heterogeneous type I. MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary, chambered, TABLE OF PHYSICAL AND MECHANICAL PROPERTIES Density q/cm3 Bending strength Modulus of Maximum crushingstrength Locality of growth | No. of trees | Moisture | | content % | Basic density | Air-dry density | elasticity GPa | Shear paralel to grain MPa Resistance to splittiing N/cm Stress at limit . Hardness N. Side grain | end grain R-Plane T-plane proportionality · MPa |

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ROTANICAL NAME: Manilkara merrilliana H. J. Lam (Sapotaceae) TRADE NAME: Duvok-duvok LOCAL NAME: Koemea (In.) HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown, red. - Odour: indistinct. - Grain: straight, wavy. - Texture: fine. - Weight: very heavy. - Shrankage: STRENGTH CLASSES: very strong. SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation: NATURE DUARBILITY: durable. .WORKING QUALITIES: moderately difficult. USES: House building, Durable timber, Turnery wood, Tool handle, Oil press, Fuel, Bedding wood material, GEOGRAPHIC DISTRIBUTION: Philippines, Indonesia. GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: large, rounded, large, gash-like. - Mean T.D.: 100-200um. - Vessel No.: 5-20/sq.mm, - Vessel element mean length; >800um, - Tyloses; present. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: >1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Banded: 1-3 cells, RAYS - Width: 1-3 cells, - multiseriate portion(s) as wide as uniseriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type 1, heterogeneous type II, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells. - crystalliferous cells: chambered.

Locality of growth No.of trees tested	Moisture Density content % Basic density	v.g/cm3 Air-dry density	Bending strength MPa	Modulus of Maximum crushingstrength elasticity GPa MPa
1	1 1			l ·
Stress at limit proportionality MPa	Hardness N. Side grain ∣ end grain	Shear parale	el to grain MPa	Resistance to splittiing N/cm R-Plane T-plane
		1		

SALUTURES FOR CO.

TRADE NAME: Nyatoh BOTANICAL NAME: Palaquium obovatum Engl. (Sapotaceae) LOCAL NAME: Nyatoh puteh (M.); Chay Gutta percha (Viet.); Chorni (Camb.); Kha-nunnok, Chiknom (Th.); Nato, Koema (In.) HABIT OF TREE: medium tree, large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct. :- Heartwood Color: brown, red. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: fine. - Weight: moderately heavy. - Shrankage: small. comparatively large. The state of the state of the state of STRENGTH CLASSES: weak. SEASONING - Air drying rates: moderately slow. - Checking: slight risk of checking. - Deformation: slight risk of deformation. RESISTANCE TO TERMITES: no, AMENABILITY TO PRESERVATIVE TREATMENT: Low. WORKING QUALITIES: moderately difficult (CARAGO CONTACT) The same of the bound of both a USES: House building, Interior finish, Ship and boat manufacturing, Furniture, Veneer, Plywood. GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, Burma, Malaysia, India, GROWTH RINGS: moderately distinct. . VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, - Perforation plates: simple, - Intervessel pits: alternate, - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sg.mm. - Vessel element mean length: 350-800um. - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: >1600um. - Wall thickness: thin to thick. AXIAL PARENCHYMA - Banded: 1-3 cells. RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type I, heterogeneous type II, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered, - Silica: present in ray cells.

9. *:4 / Will table

Locality of growth No. of tree	s Moisture Densi content % Basic density	ty g/cm3 Air-dry density	Bending stren MPa	gth Modulus of elasticity GPa	Maximum crushingstrength
Thailand	14	0.65	82.2	6.569	29.8
Stress at limit proportionality MPa	Kardness N. Side grain end grain	Shear paral	el to grain M	Pa Resistar R-F	ce to splittiing N/cm
1		15.	9 18.0		

BOTANICAL NAME: Palaquium ridleyi King et Gamble (Sapotaceae) LOCAL NAME: Nyatau (Br.): Nyatoh batu (Sab. Sar.): Nyatoh (Sab.): Nyatoh kelalang (Sar.): Bitis paya (M.) HARIT OF TREE: large tree, PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: red. purple. - Odour: indistinct. - Grain: straight to fairly interlocked. - Texture: fine. - Weight: very heavy. - Shrankage: small. comparatively large. STRENGTH CLASSES: very strong. SEASONING - Air drying rates: slow, - Checking: slight risk of checking, - Deformation: NATURE DUARBILITY: very duarble, of AMENABILITY TO PRESERVATIVE TREATMENT: low. - WORKING QUALITIES: difficult. USES: House building, Durable timber, Ship and boat manufacturing, Vehicle. Oil press, Bedding wood material. GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia, Singapore, Indo-china, Papua Néw Guinea, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern. - Vessel grouping: radial multiple, - Perforation plates: simple, - Intervessel pits: alternate, - Vessel-ray pitting: large, rounded, large, gash-like, - - Mean T.D.: 100-200um. - Vessel No.: 5-20/sq.mm. - Vessel element mean length: >800um. - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: >1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Banded: 1-3 cells, RAYS - Width: exclusively uniseriate, - Numbers: 4-12/mm, >12/mm, - Ray tissues: heterogeneous uniseriate.

ocality of grou									Maximum crushingstrength
Findonesia	·J	35	0	.85	1.043	94.3	157.7	17.84 21.0	49.0 87.4
									ce to splittiing N/cm ane T-plane
		1			5.3	5.7	9.6 . 10.4	·	

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BOTANICAL NAME: Planchonella thyrsoidea C.T. white ex F.S. Walker (Sapotaceae)
LOCAL NAME:
 HABIT OF TREE: large tree.
PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: white to grey, yellow, - Odour: indistinct, ...
                                                                                                          - Grain: straight, . . Texture: fine, - Weight: light. - Shrankage: small.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the co
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  STRENGTH CLASSES: weak.
 SEASONING - Air drying rates: - Checking: no risk of checking, - Deformation: no risk of deformation, - 1909 addition of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the companies of the 
                                                                                                                                                                                              RESISTANCE TO TERMITES: no, : AMENABILITY TO PRESERVATIVE TREATMENT: good for WORKING QUALITIES: easy to the state of the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Charlest and the Cha
  NATURE DUARBILITY: non-durable.
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 USES: House building, Furniture, Plywood,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     Line with the a tribus in some Hell
                                  Packing boxes, Cooperage, Turnery wood, Pulpwood,
  GEOGRAPHIC DISTRIBUTION: Indonesia,
  GROWTH RINGS: moderately distinct.
  VESSELS/PORES - Porosity; wood diffuse-porous. - Arrangement; in diagonal and/or radial pattern.
                                                                                     - Vessel grouping: radial multiple, - Perforation plates: simple, - Intervessel pits: alternate, . : :
                                                                                    - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um,
                                                                                     - Vessel No.: <5/sq.mm. - Vessel element mean length: >800um.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      14.00
    FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: 900-1600um. - Wall thickness: yery thin.
  AXIAL PARENCHYMA - Aportracheal p.: diffuse, - Banded: 1-3 cells.
   RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm,
                                    - Ray tissues: heterogeneous type 1, heterogeneous type 11.
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11.75

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

2007

Locality of growth No.of tr		Densit					• • • • • • • • • • • • • • • • • • •
teste	d content %	Basic density	Air-dry-density	MPa	elasticity GPa	MPa	
	1			1			er er en en en en en en en en en en en en en
Stress at limit proportionality .MPa	Langer Har Side grain	rdness N. n end grain	Shear paral	el to grain MPa	Resistar	nce to splittiing N/cm	a barrell level Mages
					1	•	

BOTANICAL NAME: Duabanga grandiflora Walp. (Sonneratiaceae) LOCAL: NAME: Lampati (Bur.In.): Phay: (Viet): Berembang bukit: Pedata bukit (M.): Amas. Tawo (In.): Banderbola (Pak.): Loktoh (Ph.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow, brown. - Odour: - Grain: straight. - Texture: medium. - Weight: light. - Shrankage: large. STRENGTH CLASSES: weak. SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: non-durable. RESISTANCE TO TERMITES: no. WORKING QUALITIES: easy. USES: Interior finish: Furniture a:Plywood: 34.13704 Packing boxes, Battery separators, Pulpwood, GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, Burma, Malaysia, Philippines, Indonesia, China, Parkistan, India, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse, - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present, - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: >200, - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits: - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Paratracheal p.: vasicentric, aliform, confluent. RAYS - interconnected (fused) rays, - Width: 1-3 cells, - multiseriate portion(s) as wide as uniseriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type I, heterogeneous type-II, and any tissues: heterogeneous type I, heterogeneous type-II, and any tissues: MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary, TABLE OF PHYSICAL AND MECHANICAL PROPERTIES Locality of growth | No. of trees | Moisture | and Density g/cm3 | Bending strength | Modulus of | Maximum crushingstrength tested | content % | Basic density | Air-dry density | MPa | elasticity GPa | ______ TO THE RESIDENCE AND A CONTRACT OF THE PROPERTY OF THE PROPERT Stress at limit | Manager | Hardness N. | | Shear paralel to grain MPa | Resistance to splitting N/cm proportionality MPa Side grain end grain R T R-Plane Toplane

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S 15,382,2347.

ROTANICAL NAME: Duabanga moluccana Blume (Sonneratiaceae) LOCAL NAME: Magasawih(M.); Loktob(Ph.); Magas, Tagahas(Sab.); Sawih(Sar.); Phay(Viet); Berambang(Br.); Dem chhoeuter(Cam.); Banderbola(Pak.); Lampati(Bur. Ind.); Myaukngo(Bur.) 18 68 ST 4 10 10/46 ARE THOSE MODEL ON HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow, brown, . - Odour: indistinct, ... - 1000 Section 1. All to Links All to - Grain: straight. - Texture: medium. - Weight: light. - Shrankage: large. Company of the North Act of the ACMASS A STATE OF THE STATE OF THE STATE OF STRENGTH CLASSES: weak. SEASONING - Air drying rates: - Checking: - Deformation: WORKING QUALITIES: moderately easy, managed a days. AMENABILITY TO PRESERVATIVE TREATMENT: low. NATURE DUARBILITY: non-durable. RESISTANCE TO TERMITES: no. The state of the second of the USES: Interior finish, Furniture, Veneer, Plywood, Commission of the Commission o Matches, Battery separators, Buoys, Pulpwood, GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia. The state of the s GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse, and the second an - Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present. The second mathematical pits and the second pits present. - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: >200, . . . grapper up to the second of the country of th - Vessel No.: <5/sq.mm, - Vessel element mean length: >800um, - Tyloses: present, ... new years and a contract the fellow of the FIBRES AND FIBRE TRACKEIDS - Pits: simple to minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, and the minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, and the minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, and the minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, and the minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, and the minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, and the minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, and the minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, and the minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, and the minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, and the minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, and the minutely bordered pits, - Mean length: >1600um, - Wall thickness: thin to thick, and the minutely bordered pits, - Mean length: - Mean le AXIAL PARENCHYMA - Paratracheal p.: vasicentric, aliform, confluent. RAYS - Width: 1-3 cells - Numbers: 4-12/mm. - Ray tissues: heterogeneous type II. heterogeneous type III.

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Locality of growth	h No.of tree	es Moisture Dens content % Basic density	ity g/cm3 Air-dry density	Bending strength	Modulus of Maximum crushingstrength elasticity GPa MPa ''''	Tours of the second sec
Philippines	1	green 0.37	0.446	43.0 61	7.80 8.1 19.6 33.4	
	limit ty MPa				Resistance to splittiing N/cm R-Plane T-plane	
3.98	2.3	2020 2560	5	.74 8.4		•

TRADE NAME: Perepat Laut BOTANICAL NAME: Sonneratia alba J. Smith, (Sonneratiaceae) LOCAL NAME: Penata(Sab.); Perepat (M. Sab. Br.); Balombo, Baropa, Bolombo peropa (In.); Pagat pat (Ph.)		in in the district series
HABIT OF TREE: large tree,		Same Argering
PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, , - Heartwood Color: red, purple, Odour: indistinct,		and the state of t
- Grain: straight to fairly interlocked, - Texture: fine, - Weight: moderately heavy, heavy,	- Shrankage: very smal	· · · · · · · · · · · · · · · · · · ·
STRENGTH CLASSES: medium,		2000年 - 1987年 - 1985年 -
SEASONING - Air drying rates: - Checking: slight risk of checking, - Deformation: slight risk of deformation,	•	
NATURE DUARBILITY: moderately durable, RESISTANCE TO TERMITES: no, WORKING QUALITIES: easy,	•	The Control of AMA
USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Furniture, Sporting goods,	•	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Gunstocks, Fuel, Pulpwood,		10 mg - 10 mg
GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia,		to the many that is the
GROWTH RINGS: indistinct or absent,		
VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,		Company of the Section 18
- Perforation plates: simple, - Intervessel pits: alternate, - vestured pits present,		•
- Vessel-ray pitting: similar to intervessel pits, large, gash-like, - Mean T.D.: 50-100um,		•
- Vessel No.: 5-20/sq.mm, 20-40/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: 900-16 AXIAL PARENCHYMA - absent or extremely rare, RAYS - Width: exclusively uniseriate, - Numbers: 4-12/mm, >12/mm, - Ray tissues: heterogeneous uniseriate, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary,	500um, - Wall thicknes	s: thin to thick,
TABLE OF PHYSICAL AND MECHANICAL PROPERTIES		en en en en en en en en en en en en en e
Locality of growth No. of trees Moisture Density g/cm3 Bending strength Modulus of Max	• •	•
tested content % Basic density Air-dry density MPa elasticity GPa	МРа	
		• •
	o splittiing N/cm	
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18. M. 18.

TRADE NAME: Mangkulang BOTANICAL NAME: Heritiera javanica Kost. (Sterculiaceae)
LOCAL NAME: Mangkulang jari (M.); Kembang (Sab.); Lumbayau (Ph.); Chum-phraek (Th.); Palapi (In.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: brown, red, with streaks. - Odour: indistinct.

- Grain: straight to fairly interlocked, - Texture: medium, - Weight: moderately heavy, - Shrankage: small,

1 2.5%
 2.4%

STRENGTH CLASSES: medium, weak,

SEASONING - Air drying rates: fast, - Checking: slight risk of checking, - Deformation: no risk of deformation,
NATURE DUARBILITY: moderately durable, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately easy,
USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, Plywood, Sporting goods,
Pulpwood.

GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Philippines, Indonesia, India, GROWTH RINGS: moderately distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: >200,
- Vessel No.: <5/sq.mm, Vessel element mean length: 350-800um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, terminal, - Paratracheal p.: scanty, vasicentric, - Banded: 1-3 cells,

RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, - Sheath cells present,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary,

- Silica: present in ray cells, present In axial parenchma cells,

MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied, Axial intercellular canals in short tangential lines,
Axial intercellular canals in diffuse, Intercellular canals of traumatic origin,

Locality of growth		•	•		y g/cm³ Air-dry densit	•		Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia	1	51	1	0.52	0.640	[68	92	10.6 12.2	31.8 50.3
Stress at limproportionality					Shear par	alel to g	rain MPa T	٠,	ce to splittiing N/cm
4.21 5.4		4230	4674		9	.9	11.7	57	63

TRADE NAME: Tan-ag BOTANICAL NAME: Kleinhovia hospita L. (Sterculiaceae)
LOCAL NAME: Gontoge, Hoentake, Katimoho, Tokoelo (In.); Timahar, Timangal (Sab.)

HABIT OF TREE: medium tree, large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: yellow, - Odour: indistinct,

- Grain: straight, - Texture: fine, - Weight: light, - Shrankage: small,

STRENGTH CLASSES: weak.

SEASONING - Air drying rates: - Checking: - Deformation:

NATURE DUARBILITY: non-durable. RESISTANCE TO TERMITES: no. WORKING QUALITIES: easy.

USES: Interior finish, Wood based panel.

Household appliance, Buoys, Pulpwood,

GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, China, India.

GROWTH RINGS: distinct, moderately distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse,

- Perforation plates: simple. - Intervessel pits: alternate.

- Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um.

- Vessel No.: 5-20/sq.mm. - Vessel element mean length: 350-800um.

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered. '- Mean length: 900-1600um, - Wall thickness: thin to thick.

AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty,

RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III, heterogeneous type III, - Tile cells: Durio type,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary,

MISCELLANEOUS: Rays storied, Axial parenchyma storied, Fibres storied,

. TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality						De sic densi									crushingstr MPa	ength
Philip	pines	.1	· 1·1 · · · · ·	12	1	0.50		0.591		81.9	75.1	8.99	8.34	35.5	32.8	
			•			s N. end grai						.			ittiing N/ T-plane	cm
8.	.75	7.57		300 3	3913	5790	5269		.8.24	8.5	2					

وتونيه ببقوط وفيا المعرف الواران

5 13 50000

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TRADE NAME: Labavo
                                                                                                                                                     BOTANICAL NAME: Melochia umbellata stapf. (Sterculiaceae)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    San San Change William
LOCAL NAME:
  HABIT OF TREE: small tree.
  PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: - Odour: indistinct.
                                                                                                                                    - Grain: straight, - Texture: fine, - Weight: light, - Shrankage: small,
   STRENGTH CLASSES: weak.
   SEASONING - Air drying rates: - Checking: slight risk of checking. - Deformation: slight risk of deformation.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               Survey of the same of the
   NATURE DUARBILITY: RESISTANCE TO TERMITES: no.
                                                                                                                                                                                                                                                                                                                                       WORKING QUALITIES: easy,

    Book of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state 
   USES: Wood based panel.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    A CONTRACTOR OF A MANAGEMENT OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY O
                                        Packing boxes, Household appliance, Matches, Battery separators, Pulpwood,
    GEOGRAPHIC DISTRIBUTION: Philippines, Papua New Guinea, India,
     GROWIN RINGS: moderately distinct.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  at the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the
      VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,
                                                                                                - Perforation plates: simple, - Intervessel pits: alternate,
                                                                                                 - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 100-200um,
                                                                                                  - Vessel No.: 5-20/sg.mm. - Vessel element mean length: 350-800um.
       FIRRES AND FIRRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: 900-1600um.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        - Wall thickness: thin to thick.
      AXIAL PARENCHYMA - Paratracheal p.: scanty,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   A. Talender Conn.
       RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm, >12/mm,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          the second of the second of the second
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  and the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s
                                          - Ray tissues: heterogeneous type II, - Tile cells: Pterospermum type,
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						Maximum crushingstrength
	4	.1			•	
Stress at limit proportionality M					Resistan R-P	ce to splittiing N/cm · · · · · · · · · · · · · · · · · · ·
						And the second s

20 April 1982 TRADE NAME: Bayur BOTANICAL NAME: Pterospermum javanicum Jungh. (Sterculiaceae) LOCAL NAME: Kedah (M.): Bajur biasa (In.) The second of the second HABIT OF TREE: large tree. 15/15/3 (64.0) PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown, red. - Odour: indistinct. - Grain: straight, - Texture: fine, - Weight: light, - Shrankage: small, The second second section is the second seco STRENGTH CLASSES: weak'. SEASONING - Air drying rates: fast. - Checking: no risk of checking. - Deformation: no risk of deformation. Committee of the Sandah NATURE DUARBILITY: non-durable. WORKING QUALITIES: easy. BAR we received USES: House building, Interior finish, Furniture, Plywood, Packing boxes. GEOGRAPHIC DISTRIBUTION: Burma, Thailand, Malaysia, Indonesia, and the second s GROWTH RINGS: distinct. VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern, in diffuse. - Perforation plates: simple, - Intervessel pits: alternate, - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: 100-200um, - Vessel No.: 5-20/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, .- Mean length: >1600um, - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, vasicentric. RAYS - interconnected (fused), rays,: - Width: 1-3 cells, - multiseriate portion(s) as wide as uniseriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, - Tile cells: Pterospermum type, MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied, TABLE OF PHYSICAL AND MECHANICAL PROPERTIES | Bending strength | Modulus of | Maximum crushingstrength Locality of growth | No. of trees | Moisture | 100 Density g/cm3 tested | content % Basic density: | Air-dry density | MPa | elasticity GPa | | 1 | 17.7 | 0.42 | 0.495 | 54 68 | 7.5 7.0 | 28.8 Stress at limit | Resistance to splitting N/cm proportionality MPa | ... Side grain | end grain | R | T | R-Plane | T-plane

4.49 | 3290 3556 | 7.0 8.6 | 45 47

TRADE NAME: White tulip oak BOTANICAL NAME: Pterygota horsfieldii Kosterm. (Sterculiaceae)

LOCAL NAME: Pterygota, Impa(N.G.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow, brown. - Odour: indistinct.

- Grain: straight to fairly interlocked, - Texture: medium, coarse, - Weight: moderately heavy, - Shrankage: comparatively large,

"TRENGTH CLASSES: medium,

GEASONING - Air drying rates: - Checking: slight risk of checking, - Deformation:

NATURE DUARBILITY: moderately durable, RESISTANCE TO TERMITES: no, WORKING QUALITIES: moderately easy,

USES: House building, Interior finish, Durable timber, Furniture, Veneer,

Packing boxes, Carvinge, Tool handle,

GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia, Papua New Guinea,

GROWTH RINGS: indistinct or absent,

J. 1980. 1887

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: >200,
- Vessel No.: <5/sq.mm, Vessel element mean; length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick,
AXIAL PARENCHYMA - Banded: 1-3 cells. >3 cells.

RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, - Ray tissues: heterogeneous type II, - Sheath cells present, - Tile cells: Pterospermum type, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary, MISCELLANEOUS: Axial parenchyma storied, Fibres storied,

Locality of growth				ty g/cm3 Air-dry density				Maximum crushingstrength MPa
Malaysia	1	80	0.48	0.575	51	84	9.200 11.10	27.6 45.8
Stress at l proportionality	imit [MPa			Shear paral R	el to grain	MPa T	•	ce to splittiing N/cm lane T-plane
	1			7.3	10.8		1	

TRADE NAME: Samrong BOTANICAL NAME: Scaphium macropodum Beumee ex Heyne (Sterculiaceae) Control Silver Silver LOCAL NAME: Kembang semangkok (M.): Kapas-kapasan (In.) 41.0 (13.4) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow, brown. - Odour: indistinct. - Grain: straight to fairly interlocked, - Texture: medium, - Weight: moderately heavy. - Shrankage: small. STRENGTH CLASSES: strong, medium. SEASONING - Air drying rates: fast. - Checking: slight risk of checking. - Deformation: slight risk of deformation, NATURE DUARBILITY: moderately durable. AMENABILITY TO PRESERVATIVE TREATMENT: good. WORKING QUALITIES: easy. USES: Interior finish, Furniture, Veneer, Plywood, a manage control total GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Indonesia. Commission of Constitution of the Grand GROWTH RINGS: moderately distinct. 980atts (1985s) (1995) VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse. Service of the servic - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits, - Mean T.D.: >200. - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: terminal. - Paratracheal p.: vasicentric. aliform. confluent. - Banded: 1-3 cells. >3 cells. RAYS - rays of two distinct sizes. - Width: commonly 4-10 seriate. commonly >10 seriate. - Numbers: 4-12/mm. - Ray tissues: heterogeneous type II. heterogeneous type III. MINERAL INCLUSIONS - Silica: present in ray cells, present In axial parenchma cells, MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth No.of trees Moisture Density g/cm3 Be	
Malaysia 3 16.8 0.59	103 17.0 17.0 50.2 59.5
Stress at limit Hardness N. Shear paralel proportionality MPa Side grain end grain R	ain MPa Resistance to splittiing N/cm The R-Plane T-plane
4940 5207 10.1	

TRADE NAME: Kelumpang BOTANICAL NAME: Sterculia foetida L. (Sterculiaceae) LOCAL NAME: Kalumpang (Ph.); Kepuh, Galoempang, kaloempang, kaloemba (In.); Kelumpang jari (M.) HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct. - Heartwood Color: vellow. brown. - Odour: - Grain: oblique. - Texture: coarse. - Weight: light, moderately heavy. - Shrankage: STRENGTH CLASSES: weak. SEASONING - Air drying rates: - Checking: - Deformation: . NATURE DUARBILITY: non-durable. WORKING QUALITIES: easy. USES: House building, Furniture, Veneer, Plywood, Packing boxes. Household appliance. GEOGRAPHIC DISTRIBUTION: Thailand, Malaysia, Philippines, Indonesia, China, India, GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Perforation plates: simple, - Intervessel pits: alternate, - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: >200. - Vessel No.: <5/sq.mm. - Vessel element mean length: 350-800um, - Tyloses: present. FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: vasicentric. aliform. RAYS - Width: commonly >10 seriate. - Numbers: <4/mm. - Ray tissues: heterogeneous type II. heterogeneous type III. - Sheath cells present. - Tile cells: Durio-Pterospermum type. MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary, chambered, MISCELLANEOUS: Axial parenchyma storied.

ocality of growth No.of trees	s Moisture Densit content % Basic density			
Stress at limit proportionality MPa	Hardness N. Side grain end grain	Shear paralel to grain R	MPa Resistan T R-P	ce to splittiing N/cm lane T-plane
1		1 :	1	

TRADE NAME: Samak BOTANICAL NAME: Schima wallichii choisy (Theaceae) LOCAL NAME: Mang-tan, Ta-lo (Th.); Chilauni (Ind.); Puspa (In.); medang Gatal (Sab.); Kelinchi padi (Br.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown, red. - Odour: - Grain: oblique. - Texture: very fine. - Weight: moderately heavy. - Shrankage: very large. STRENGTH CLASSES: medium, SEASONING - Air drying rates: - Checking: hight risk of checking. - Deformation: hight risk of deformation. WORKING QUALITIES: moderately easy NATURE DUARBILITY: non-durable. AMENABILITY TO PRESERVATIVE TREATMENT: medium. USES: Durable timber, Vehicle, Furniture, Veneer, Plywood, Packing boxes, Food containers, Turnery wood. GEOGRAPHIC DISTRIBUTION: Burma, Thailand, Malaysia, Indonesia, China, India, GROWTH RINGS: moderately distinct, indistinct or absent, VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Vessel grouping: exclusively solitary, solitary vessel outline angular. - Perforation plates: scalariform. - Intervessel pits: extremely rare or absent, - Vessel-ray pitting: large, rounded, large, gash-like, - Vessel with helical thickenings, - Mean T.D.: 50-100um, - Vessel No.: 20-40/sq.mm. 40-100/sq.mm. - Vessel element mean length: >800um, FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered. - Mean length: >1600um. - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse. RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type 1, heterogeneous type II, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, - crystalliferous cells: chambered,

Lo	ocality of growth					y g/cm3 Air-dry densit						Maximum crushingstreng MPa	jth
	Malaysia	1. 3	16.7	.	0.59	0.720		88	98	12.0	11.9	46.3 54.6	
	Stress at l proportionality	•				Shear par	alel t	o grain	MPa T	R		to splittiing N/cm	
•	5.45	5.87	5650 59	38		1	12.3	14.7			67	89	

TRADE NAME: Tapmis BOTANICAL NAME: Ternstroemia megacarpa Merr. (Theaceae) LOCAL NAME: ja or jakan lawa ka K**ina** C HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown, red. - Odour: indistinct. - Grain: interlocked. - Texture: very fine. - Weight: light. moderately heavy. - Shrankage: STRENGTH CLASSES: weak. SEASONING - Air drying rates: - Checking: - Deformation: WORKING QUALITIES: easy, NATURE DUARBILITY: USES: Furniture, Plywood, Packing boxes, Household appliance, GEOGRAPHIC DISTRIBUTION: Philippines. GROWTH RINGS: indistinct or absent. VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse. - Vessel grouping: exclusively solitary, solitary vessel outline angular, - Perforation plates: scalariform, - Intervessel pits: opposite, scalariform - Vessel-ray pitting: similar to intervessel pits, - Vessel with helical thickenings, - Mean T.D.: 100-200um, - Vessel No.: 20-40/sq.mm, - Vessel element mean length: >800um, FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, RAYS - interconnected (fused) rays, - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type I, heterogeneous type II,

1.5

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth No.of tree	s Moisture Dens	sity g/cm3	Bending strength	Modulus of	Maximum crushingstrength	
tested	. content % Basic density	y .Air-dry density	MPa	elasticity GPa	MPa.	ा । अनुस्थानकः का प्रश्नानसङ्गति । । इ
	[0.04]		1		1	eteren
	Hardness N. Side grain end grain		lel to grain MPa	Resistan R-P	nce to splittiing N/cm Plane T-plane	en en en en en en en en en en en en en e
						en en en en en en en en en en en en en e

TRADE NAME: Punah BOTANICAL NAME: Tetramerista glabra Mig. (Tetrameristaceae) LOCAL NAME: Entuyut, Kaju hujan (Sar.); Tuyot (Sab.); Punak, Bangkalis (In.); Amat (Br.) HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: brown, red. with streaks. - Odour: indistinct. - Grain: straight. - Texture: medium. - Weight: heavy. - Shrankage: comparatively large. STRENGTH CLASSES: strong, medium, SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: moderately durable. AMENABILITY TO PRESERVATIVE TREATMENT: medium. WORKING QUALITIES: easy. USES: House building, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, Sporting goods, Agricultural implement wood. GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia.

GROWTH RINGS: indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern,

- Vessel grouping: radial multiple. Perforation plates: simple. Intervessel pits: alternate.
- Vessel-ray pitting: similar to intervessel pits. Mean T.D.: >200.
- Vessel No.: 5-20/sq.mm, Vessel element mean length: >800um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits. - Mean length: >1600um. - Wall thickness: yery thick. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty,

RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type I, - Sheath cells present, MINERAL INCLUSIONS - Crystals: Raphides crystals present, in ray cells. - crystalliferous cells: ordinary,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth		Moisture Dens content % Basic density				
Malaysia	1 1	18.9 0.63	0.785	87 105	15.4 15.8	49.4 64.1
	•	Hardness N. Side grain end grain	•	-	:	ce to splittiing N/cm lane T-plane
5.72	6.72 4	4670 5216	, 9.7	12.3	43	80

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TRADE NAME: Ramin BOTANICAL NAME: Gonystylus bancanus (Mig.) Kurz (Thymelaeaceae)

LOCAL NAME: Ramin telur (Sar.); Ramin melawis (M.); Lanutan-Bagio (Ph.); Gaharu buaya, Garu buaja (In.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow. - Odour: indistinct.

- Grain: straight to fairly interlocked. - Texture: fine. - Weight: moderately heavy. - Shrankage: small.

STRENGTH CLASSES: strong, medium,

SEASONING - Air drying rates: fast, - Checking: slight risk of checking, - Deformation:

NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no, AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: easy,

USES: House building, Interior finish, Furniture, Veneer, Plywood, Culture,

GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia,

GROWTH RINGS: indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, Vessel element mean length: 350-800um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Paratracheal p.: aliform, confluent, - Banded: 1-3 cells,

RAYS - Width: exclusively uniseriate. - Numbers: 4-12/mm, - Ray tissues: homogeneous uniseriate.

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, Styloid crystals present, in ray cells, - crystalliferous cells: ordinary,

Locality of grow	th No.of tree		Density g/cm3 ensity Air-dry dens	Bending strength	Modulus of elasticity GPa	Maximum crushingstrength MPa
Malaysia	5	18.6 0.5	8 0.675	88 105	15.9 16.3	48.8 57.6
Stress a		Hardness N. Side grain end	•	aralel to grain MPa	•	nce to splittiing N/cm lane T-plane
	1	4580 5075		8.5 10.7	34	44

TRADE NAME: Balobo BOTANICAL NAME: Diplodiscus paniculatus Turcz. (Tiliaceae)

HABIT OF TREE: medium tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: yellow, brown, - Odour: indistinct,

- Grain: straight, - Texture: fine, - Weight: moderately heavy, - Shrankage: large,

STRENGTH CLASSES: medium.

SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: non-durable. WORKING QUALITIES: easy.

USES: House building, Interior finish, Textile timber, Sporting goods,

Agricultural implement wood, Packing boxes, Turnery wood, Tool handle, Pulpwood, Disposable chopsticks etc., GEOGRAPHIC DISTRIBUTION: Philippines.

GROWIN RINGS: moderately distinct, indistinct or absent.

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diagonal and/or radial pattern,

- Vessel grouping: radial multiple, Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, 20-40/sq.mm, Vessel element mean length: 350-800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, terminal, - Paratracheal p.: scanty, - Banded: 1-3 cells,

RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary,

MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth					Bending strength MPa		Maximum crushingstrength MPa
Philippines	2	12	0.64	0.750	128 117	14.6 13.5	56.4 52.1
	limit y MPa		ess N. end grain		el to grain MPa.	:	ce to splittiing N/cm lane T-plane
11.9	10.3	7300 6643	9400 8554	11.	4 11.8		

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TRADE NAME: Thitka BOTANICAL NAME: Pentace burmanica Kurz. (Tiliaceae) LOCAL NAME: Burma Mahogany, Kashit (Bur.); Sisiat-pluak (Th.); melunak (M.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: brown, red, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: fine, - Weight: moderately heavy, - Shrankage: large,

STRENGTH CLASSES: medium.

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,
NATURE DUARBILITY: durable, RESISTANCE TO TERMITES: yes, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately difficult,

USES: House building, Interior finish, Ship and boat manufacturing, Vehicle, Furniture, Plywood,

Household appliance, Turnery wood, Carvinge,

GEOGRAPHIC DISTRIBUTION: Burma, Thailand,

GROWTH RINGS: moderately distinct, indistinct or absent,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, 20-40/sq.mm, Vessel element mean length: 350-800um, Tyloses: present, FIBRES AND FIBRE TRACHEIDS Pits: moderately distinct bordered, Mean length: >1600um, Wall thickness: thin to thick,

. AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, terminal, - Paratracheal p.: scanty, - Banded: 1-3 cells,

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III, MISCELLANEOUS: Rays storied, Axial parenchyma storied, Vessels storied, Fibres storied,

ocality of gr		es Moisture Densi content % Basic density				
Burma				90.6	17.94	51.1
	s at limit nality MPa	Hardness N. Side grain end grain	Shear paral	el to grain MPa	•	ce to splittiing N/cm lane T-plane
					. 1	

TRADE NAME: Nahien BOTANICAL NAME: Pentace tonkinensis A. Chev. (Tiliaceae) LOCAL NAME: Trasiet(): Sisiet (Cam.): HABIT OF TREE: large tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct - Heartwood Color: brown red - Odour: indistinct. - Grain: interlocked, - Texture: fine, - Weight: very heavy, - Shrankage: STRENGTH CLASSES: strong. SEASONING - Air drying rates: - Checking: - Deformation: NATURE DUARBILITY: very duarble. WORKING QUALITIES: very difficult. USES: House building, Durable timber, Ship and boat manufacturing, Vehicle, Household appliance, Tool handle, Oil press, Bedding wood material, GEOGRAPHIC DISTRIBUTION: Vietnam, Cambodia, GROWTH RINGS: moderately distinct, indistinct or absent, VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diagonal and/or radial pattern, in diffuse. - Perforation plates: simple. - Intervessel pits: alternate. - Vessel-ray pitting: similar to intervessel pits. - Mean T.D.: 100-200um. - Vessel No.: 5-20/sq.mm, 20-40/sq.mm, - Vessel element mean length: 350-800um, Gums and other deposits, FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: 900-1600um, - Wall thickness: very thick, AXIAL PARENCHYMA - Paratracheal p.: scanty, - Banded: 1-3 cells, RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells. - crystalliferous cells: ordinary. MISCELLANEOUS: Rays storied. Axial parenchyma storied. Vessels storied. Fibres storied.

				Bending strength MPa		Maximum crushingstrength MPa
		•				1
Stress at limit proportionality MA	•		Shear parale	el to grain MPa	:	ce to splittiing N/cm lane T-plane
1			1			

TRADE NAME: Magabuyo BOTANICAL NAME: Celtis luzonica Warb. (Ulmaceae)

LOCAL NAME: Kaju lulu (In.)

HABIT OF TREE: medium tree, large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: - Heartwood Color: white to grey, yellow, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: medium, - Weight: moderately heavy, - Shrankage:

STRENGTH CLASSES: medium.

SEASONING - Air drying rates: - Checking: - Deformation:

NATURE DUARBILITY: RESISTANCE TO TERMITES: moderately, WORKING QUALITIES: easy,

USES: House building, Furniture, Plywood, Sporting goods,

Pulpwood,

GEOGRAPHIC DISTRIBUTION: Philippines, Indonesia.

GROWTH RINGS: moderately distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits. Mean T.D.: 100-200um,
- Vessel No.: <5/sq.mm, Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Paratracheal p.: aliform, confluent,

RAYS - Width: commonly 4-10 seriate, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type III, heterogeneous type III,

MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in axial parenchyma cells, in ray cells, - crystalliferous cells: ordinary,

Locality of grow		es Moisture Densi content % Basic density				
Philippines	2	12 0.56	0.648 83.2	2 76.3	10.3 9.55 44.9	9 41.5
	•	Hardness N. Side grain end grain	Shear paralel to g		Resistance to sp R-Plane	
8.89	7.69	4830 4395 6300 5 <i>7</i> 3	33 12.8	13.2		

TRADE NAME: Anabiona ROTANICAL NAME: Trema orientalis (L.) Bl. (Ulmaceae) LOCAL NAME: Menarong, Mengkirai (M.): Anggerung besar, Kurai, kawae mogane, Kaoetoe, Mawa, Siapo, Ngawoi (In.); Halin-dagang (Sab.); Marong (Sar) HABIT OF TREE: medium tree. PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow, brown, - Odour: indistinct. - Grain: straight. - Texture: fine. - Weight: very light. - Shrankage: very large. STRENGTH CLASSES: very weak. SEASONING - Air drying rates: fast. - Checking: no risk of checking. - Deformation: no risk of deformation. NATURE DUARBILITY: non-durable. RESISTANCE TO TERMITES: no. AMENABILITY TO PRESERVATIVE TREATMENT: medium. WORKING QUALITIES: easy. USES: Interior finish. Packing boxes, Household appliance, Buoys, Pulpwood, GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines, Indonesia, China, GROWTH RINGS: indistinct or absent; VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse, - Perforation plates: simple, - Intervessel pits: alternate. - Vessel-ray pitting: large, rounded, large, gash-like, - Mean T.D.: 100-200um, - Vessel No.: <5/sq.mm, - Vessel element mean length: 350-800um, - Tyloses: present, FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Mean length: >1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Paratracheal p.: scanty, RAYS - interconnected (fused) rays; - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: heterogeneous type II, heterogeneous type III,

Locality of growth	•			• •	Bending strength MPa	·	Maximum crushingstrength MPa
Philippines	1	12	0.36	0.432	60.3 60.3	6.37 5.48	26.7 24.7
	•		ness N. end grain	•	el to grain MPa	•	ce to splittiing N∕cm lane T-plane
3.65	3.16 2	450	3360	8.6	8.93	1	

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BOTANICAL NAME: Gmelina arborea L. (Verbenaceae) TRADE NAME: Gamari LOCAL NAME: Gumhar (Ind.): Yamane (Bur.): Kaju titi (In.): Gumari, So. Saw (Th.): Gmelina, Yemane (Ph.)

HABIT OF TREE: large tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: white to grev. yellow. - Odour: indistinct.

- Grain: straight to fairly interlocked, wavy. - Texture: medium. - Weight: light. - Shrankage: comparatively large.

Conservation Conservation

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STRENGTH CLASSES: weak.

SEASONING - Air drying rates: fast. - Checking: - Deformation:

WORKING QUALITIES: easy. NATURE DUARBILITY: durable. RESISTANCE TO TERMITES: yes. AMENABILITY TO PRESERVATIVE TREATMENT: medium.

USES: House building, Interior finish, Ship and boat manufacturing, Vehicle, Furniture, Veneer, Plywood,

Wood mould, Turnery wood, Carvinge, Matches, Pulpwood,

GEOGRAPHIC DISTRIBUTION: Cambodia, Burma, Thailand, Philippines, China, India,

GROWTH RINGS: distinct.

VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse.

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits. Mean T.D.: >200,
- Vessel No.: <5/sq.rm, Vessel element mean length: 350-800um, Tyloses: present.

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Septate fibres: common, - Mean length: 900-1600um. - Wall thickness: thin to thick. and the second s

AXIAL PARENCHYMA - Aportracheal p.: terminal. - Paratracheal p.: scanty, vasicentric. aliform. confluent.

RAYS - interconnected (fused) rays. - Width: 1-3 cells, commonly 4-10 seriate. - Numbers: <4/mm.

- Ray tissues: homogeneous multiseriate, heterogeneous multiseriate,

MINERAL INCLUSIONS - Crystals: Acicular crystals present, in ray cells. - crystalliferous cells: ordinary.

Locality of growth		s Moisture Den content % Basic densit				Maximum crushingstrength	
Malaysia	5	16.9 0.41	. 0.480	61 75	9.6 8.9	32.5 38.7	
		Hardness N. Side grain ∣ end grair				nce to splittiing N/cm `Plane T-plane	
2.97 3	3.22	2580 2727	7.	7 9.2	49	53	

TRADE NAME: Sungkai BOTANICAL NAME: Peronema canescens Jack. (Verbenaceae)

LOCAL NAME: Sukai, Cherek (M.): Diati sabrang (In.).

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow. - Odour:

- Grain: straight, '- Texture: medium; - Weight: moderately heavy, - Shrankage:

STRENGTH CLASSES: medium.

SEASONING - Air drying rates: moderately fast, - Checking: slight risk of checking, - Deformation: slight risk of deformation, NATURE DUARBILITY: moderately durable, AMENABILITY TO PRESERVATIVE TREATMENT: good, WORKING QUALITIES: moderately easy,

USES: House building, Interior finish, Durable timber, Vehicle, Furniture, Veneer, Plywood,

GEOGRAPHIC DISTRIBUTION: Burma, Thailand, Malaysia, Indonesia,

GROWTH RINGS: distinct.

VESSELS/PORES - Porosity: wood ring-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.:
- Vessel No.: Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: scanty, aliform, confluent,

RAYS - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type III, heterogeneous type III,

Locality of growth No.of tr	rees Moisture Densit ed content % Basic density	y g/cm³ Air-dry density	Bending strength MPa	Modulus of Maximum crushingstrength elasticity GPa MPa
Indonesia	0.63	0.725	66.96 69.75	8.235 7.995 31.08 33.78
Stress at limit proportionality MPa	Hardness N. Side grain end grain	Shear paralo	el to grain MPa], T	Resistance to splittiing N/cm R-Plane T-plane
	1	6.1 4.2	6.9 4.8	

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TRADE NAME: Teak BOTANICAL NAME: Tectona grandis L. f. (Verbenaceae)

LOCAL NAME: Jati (In.); Kyun (Bur.); Mai sak (Th.)

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HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: clearly distinct, - Heartwood Color: yellow, brown, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: coarse, - Weight: moderately heavy, - Shrankage: small.

STRENGTH CLASSES: medium.

SEASONING - Air drying rates: fast, - Checking: no risk of checking, - Deformation: no risk of deformation,

NATURE DUARBILITY: very duarble, RESISTANCE TO TERMITES: yes, AMENABILITY TO PRESERVATIVE TREATMENT: low, WORKING QUALITIES: moderately easy,

USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Vehicle, Furniture, Veneer, Plywood, Musical instruments,

Packing boxes, Wood mould, Cooperage,

GEOGRAPHIC DISTRIBUTION: Vietnam, Burma, Thailand, Philippines, Indo-china, China, India,

GROWTH RINGS: distinct.

VESSELS/PORES - Porosity: wood ring-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits, -- Mean T.D.: >200,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: <350um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick,

AXIAL PARENCHYMA - Aportracheal p.: terminal, - Paratracheal p.: scanty, vasicentric,

RAYS - interconnected (fused) rays, - Width: 1-3 cells, commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm,

- Ray tissues: homogeneous uniseriate and multiseriate, heterogeneous type III,

Locality of growth	•	Moisture Densit content % Basic density	•		Modulus of Maximum elasticity GPa	crushingstrength MPa
Malaysia	9	15.0 0.54	0.625	86 90	10.3 10.0 45.8	49.8
	•	Hardness N. Side grain end grain	•	l to grain MPa		ittiing N/cm T-plane
5.79	5.79	4805 4805	10.6	12.0	59	73

TRADE NAME: Entapuloh BOTANICAL NAME: Teijsmanniodendron sp. (Verbenaceae) LOCAL NAME: Buak buak(Sab.)

HABIT OF TREE: small tree, medium tree.

PHYSICAL PROPERTIES - Heartwood and Sapwood: distinct, - Heartwood Color: yellow, brown, - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: fine, - Weight: light, moderately heavy, - Shrankage:

STRENGTH CLASSES: medium.

SEASONING - Air drying rates: - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: moderately durable, non-durable, AMENABILITY TO PRESERVATIVE TREATMENT: medium, WORKING QUALITIES: easy,

USES: House building, Interior finish, Furniture,

Agricultural implement wood, Packing boxes,

GEOGRAPHIC DISTRIBUTION: Malaysia, Philippines,

GROWTH RINGS: moderately distinct.

VESSELS/PORES - Porosity: wood diffuse-porous. - Arrangement: in diffuse.

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: large, rounded, large, gash-like, Mean T.D.: >200,
- Vessel No.: <5/sq.mm, 5-20/sq.mm, Vessel element mean length: 350-800um,

FIBRES AND FIBRE TRACHEIDS - Pits: moderately distinct bordered, - Septate fibres: common, - Mean length: >1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: scanty,

RAYS - Width: commonly 4-10 seriate, - Numbers: <4/mm, 4-12/mm, - Ray tissues: heterogeneous type II,

TABLE OF PHYSICAL AND MECHANICAL PROPERTIES

Locality of growth No.of tree	es Moisture . Density Content % Basic density				
Malaysia	15	0.763	90 93.8	11.7 11.36	45 48.9
	Hardness N. Side grain end grain				ce to splittiing N/cm lane T-plane
The second secon		10	11.4		

- 199 -

TRADE NAME: Leban BOTANICAL NAME: Vitex cofassus Reinw. (Verbenaceae)

LOCAL NAME: Gofasa, Gupasa, Biti, Awola, Katonding, Nanasa, Tompira, Wola, Fafa (In.).

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapvood: indistinct - Heartwood Color: Vellow

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct, - Heartwood Color: yellow, brown, . - Odour: indistinct,

- Grain: straight to fairly interlocked, - Texture: fine, - Weight: moderately heavy, - Shrankage: large,

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STRENGTH CLASSES: medium.

SEASONING - Air drying rates: - Checking: - Deformation: slight risk of deformation,

NATURE DUARBILITY: durable, RESISTANCE TO TERMITES: moderately, AMENABILITY TO PRESERVATIVE TREATMENT: Low, WORKING QUALITIES: moderately easy,

USES: House building, Interior finish, Durable timber, Ship and boat manufacturing, Furniture, Veneer, Plywood,

Carvinge, Tool handle, Bent wood,

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GEOGRAPHIC DISTRIBUTION: Malaysia, Indonesia, Papua New Guinea,

GROWTH RINGS: distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Perforation plates: simple, Intervessel pits: alternate,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: 100-200um,
- Vessel No.: 5-20/sq.mm, Vessel element mean length: 350-800um, Tyloses: present,

FIBRES AND FIBRE TRACHEIDS - Pits: simple to minutely bordered pits, - Septate fibres: common, - Mean length: 900-1600um, - Wall thickness: thin to thick, AXIAL PARENCHYMA - Aportracheal p.: diffuse, terminal, - Paratracheal p.: scanty,

RAYS - Width: 1-3 cells, - Numbers: 4-12/mm, - Ray tissues: homogeneous multiseriate, heterogeneous type III, MINERAL INCLUSIONS - Crystals: Prismatic crystals present, in ray cells, - crystalliferous cells: ordinary,

•	Moisture Densit content % Basic density		•	Modulus of Maximum crushingstrength elasticity GPa MPa
Indonesia	15.6	0.841	83.4 89.0	12.26 12.01 55.1 61.7
Stress at limit proportionality MPa		Shear para R	lel to grain MPa	Resistance to splittiing N/cm R-Plane T-plane
1		6.9 8.	7.6 8.8	

TRADE NAME: Lilin BOTANICAL NAME: Xanthophyllum excelsum Miq. (Xanthophyllaceae)
LOCAL NAME: Bok-bok (Ph.): Gading, Kiendog, Mendjalin, minak angat (In.): Nyalin (M.)

HABIT OF TREE: large tree,

PHYSICAL PROPERTIES - Heartwood and Sapwood: indistinct. - Heartwood Color: yellow. - Odour: indistinct.

- Grain: straight, - Texture: medium, coarse, - Weight: moderately heavy, - Shrankage: comparatively large,

STRENGTH CLASSES: strong.

SEASONING - Air drying rates: moderately slow, - Checking: slight risk of checking, - Deformation: slight risk of deformation,

NATURE DUARBILITY: non-durable, RESISTANCE TO TERMITES: no, WORKING QUALITIES: easy,

USES: House building, Interior finish, Furniture, Plywood,

GEOGRAPHIC DISTRIBUTION: Philippines, Indonesia,

GROWTH RINGS: moderately distinct,

VESSELS/PORES - Porosity: wood diffuse-porous, - Arrangement: in diffuse,

- Vessel grouping: exclusively solitary, Perforation plates: simple, Intervessel pits: alternate, extremely rare or absent,
- Vessel-ray pitting: similar to intervessel pits, Mean T.D.: >200,
- Vessel No.: <5/sq.mm, Vessel element mean length: 350-800um, Gums and other deposits,

FIBRES AND FIBRE TRACHEIDS - Pits: distinct bordered, - Mean length: 900-1600um, - Wall thickness: thin to thick,

TRACHEIDS: vasicentric, AXIAL PARENCHYMA - Aportracheal p.: diffuse, diffuse-in-aggregates, - Paratracheal p.: scanty, - Banded: 1-3 cells,

RAYS - interconnected (fused) rays, - Width: 1-3 cells, - multiseriate portion(s) as wide as uniseriate, - Numbers: 4-12/mm, >12/mm,

- Ray tissues: heterogeneous type I, - Tile cells: Pterospermum type,

Locality of growth	•	Moisture Density content % Basic density		•	Modulus of elasticity GPa	Maximum crushingstrength MPa
Philippines	5	12 0.64	0.807	120 110	15.2 14.1	61.9 57.2
	•	Hardness N. Side grain end grain	Shear paral	el to grain MPa	<u>!</u>	e to splittiing N/cm ane T-plane
11.4 9	.86	7570 6889 9280 8445	12.	1 12.5		

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