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## INTRODUCTION

This handbook has been formulated to promote the use of the Lesser Utilised Species (LUS) of woods found in Guyana's forest. The compilation of this handbook is a collaborative effort between the Forest Products Development and Marketing Council, the Guyana Forestry Commission and the Forest Products Association. Information from the industry was also used to compile this handbook along with referenced literature.

This handbook is designed to assist end users of timber. These include contractors, carpenters, lumberyard dealers and potential home owners. It provides information on the Lesser Utilised Species of timber which contain comparable properties in terms of application use, green density, heartwood colour, grain and texture to those of commercial species. It must be noted that the compiled list of species comprises the 15 tested species researched by Timber Research and Development Association (TRADA)and Tropenbos International Foundation. The other 11 species have been subjected to some amount of testing.

Revisions were made in this handbook to increase its usefulness by grouping the species according to their density classes. The very heavy to heavy densities are listed in category one, medium density is listed in category two and light to very light densities comprises category three. Using the comparable properties of commercial species listed, consumers should be able to easily compare and confidently select Lesser Utilised Species for end use-applications in their building projects.

There are advantages in using LUS in building projects for consumers/end users and these include affordability and availability. The main advantage however is to widen species utilization which would ultimately reduce "creaming" of the forest.

Since this handbook was first published marketing information suggests that there has been an increase in the demand of the LUS. This is evidenced by the increase in demand both locally and internationally for species such as Black Kakaralli and Darina from categories one and two respectively.

The FPDMC would like to acknowledge the contributions of all those stakeholders who have supported the production of this handbook, this being our second revised edition over the period 2012-2016. Their contributions in the form of advertising have made it possible to distribute this handbook free of cost to those who will find it useful in the woodworking projects.

## **EXPLANATORY NOTES**

#### **Guyanese Name**

The vernacular names used in Guyana and other producing countries

#### **Wood Description**

Heartwood - colour of inner most part of the log

**Grain** – general alignment of fibers (straight, slightly and/or occasionally interlocked, highly and/or frequently interlocked)

Texture: the feel of the grain in the wood

#### **Physical Properties**

Air Dry Density at 12% Moisture Content (MC)

These values, expressed in g/cm³, indicate the possible range or the average weight per volume of wood at 12% moisture. The density category refers to the following classification system:

 Very light
 : under 0.50 g/cm³

 Light
 : 0.50 to 0.65 g/cm³

 Medium
 : 0.65 to 0.80 g/cm³

 Heavy
 : 0.80 to 0.95 g/cm³

 Very heavy
 : over 0.95 g/cm³

#### Strength

The strength of a species can be assessed using various methods but in this handbook the general strength is assessed using the modulus of elasticity.

Modulus of Elasticity		N/ mm <sup>2</sup>
Very High		19,000
High	There	14,000-19,000
Medium	users	11,000-14,000
Low users	Z LOW	9,000-11,000
Very Low		9,000

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HOME OWNERS/BUILDERS

**Add Value with Lesser Used Species** 

Same Great Finish at a Lesser Price

#### **STAIRS** · Wina Kakaralli **FLOORING** · Darina · Muniridan · Manni WALLS · Fukadi · Tonka Bean · Limonaballi · Morabukea ·Wadara **CEILING** · Cow Wood · Wina Kakaralli · Kauta · Darina · Burada · Itikiboroballi · Darina · Manni · Hajariballi · Pakuri · Waramadang · Darina

Lesser Used Species of Guyana's Hardwood proven integrity and durability tested by TRADA.



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## QUICK REFERENCE GUIDE FOR COMMON USE

Application	Recommended Lesser Used Species
Heavy Carpentry	Black Kakaralli ( Piling) Tonka Bean, Morabukea, Kautaballi,Kokoritaballi, Wina Kakaralli, Fukadi, Darina, Limonaballi
Flooring	Black Kakaralli, Tonka Bean, Morabukea, Kautaballi, Kokoritaballi, Wina Kakaralli, Fukadi, Darina, Burada, Wadara.
House Framing	Black Kakaralli, Tonka Bean, Morabukea, Kautaballi, Kokoritaballi, Wina Kakaralli, Fukadi, Burada, Kurokai, Limonaballi.
Outdoor Furniture	Black Kakaralli, Tonka Bean, Morabukea, Kautaballi, Kokoritaballi, Wina Kakaralli, Fukadi, Darina.
Cabinetry	Itikiboroballi, Darina, Fukadi, Cow Wood.
Wall Panels	Darina, Itikiboroballi, Kurokai
Ceiling Panels	Darina , Korokororo
Decking	Morabukea
Joinery	Morabukea, Wadara, Muniridan, Darina, Duka, Maho
Moulding	Futui, Dalli, Wadara, Darina, Duka
Staircases	Itikiboroballi, Darina, Burada, Black Kakaralli, Tonka Bean, Kurokai, Morabukea.

## A Comparison Density of LUS and CommercialSpecies

Density	LUS	Density	Compared Commercial	Density
Category		g/cm <sup>3</sup>	Species	g/cm <sup>3</sup>
Very	Black Kakaralli	1.07	Greenheart	0.97
Heavy			Purple Heart	0.84
	MoraBukea	1.03	Shibadan	0.95
			Mora	0.99
	Tonka Bean	1.07	Bulletwood	1.10
			Tatabu	0.91
Heavy	Burada	0.89	Locust	0.88
			Tauroniro	0.95
	Fukadi	0.84	Kabukalli	0.84
			Mora	0.99
	Itikiboroballi	0.89	Aromata	0.96
			Wallaba	0.92
Medium	Suya	0.71	Determa	0.66
			Dakama	0.71
	Cow Wood	0.80	Crabwood	0.67
			Kabukalli	0.84
	Manni	0.72	Determa	0.66
			Dakama	0.71
Light	Wadara	0.62	Yellow Silverballi	0.58-0.64
			White Cedar	0.67
	Iteballi	0.58-0.62	Ulu	0.59
			Baromalli	0.59
	Korokororo	0.62	Yellow Silverballi	0.58-0.64
			White Cedar	0.67
Very	Futui	0.43	Simarupa	0.41
Light			Kereti Silverballi	0.42
	Duka	0.40-0.48	Baradan	0.54
			Dukali	0.52
	Dalli	0.46	Simarupa	0.41
			Kereti Silverballi	0.42

## **Very Heavy to Heavy Density Species**

Common Name	International Trade Name	Botanical/ Scientific Name	Density g/cm³
Kokoritaballi	Abiuranta	Pouteria cuspidata	1.07-1.33*
Black Kakaralli	Black Kakaralli	Eschweilera spp.	1.07
Tonka Bean	Cumaru	Dipteryx odorata	1.07
Kauta	Kauta	Licania laxiflora	1.03
Kautaballi	Kautaballi	Licania majuscule	1.03
Morabukea	Morabukea	Mora gonggrijpii	1.03
Limonaballi	Limonaballi, Abiurana	Chrysophyllum pomiferum	0.95
Burada	Burada	Parinari Campestris	0.89
Itikiboroballi	Itikiboroballi	Swartzia spp.	0.89
Wina Kakaralli	Wina	Lecythis corrugata	0.86-0.96*
Fukadi	Nargusta	Buchenavia fanshawei	0.84

<sup>\*</sup>Data from two different reference sources



## **KOKORITABALLI**

Density category: Very Heavy

Application: Heavy construction, industrial flooring, dragline/cranes

mats

## Commercial Species grouped with Kokoritaballi:

Moraballi, Aromata, Shibadan, Greenheart, Tatabu

Air Dry Density at 12% Moisture Content: 1.07-1.33\*

Heartwood: Reddish brown

Grain: Straight Texture: Fine

## **Processing:**

Sawing: power required, blunting effect

Drying: air dried at moderate rate

• Machining: difficult due to hardness; special tools required

Nailing: pre-boring necessary

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	259 users	
Modulus of elasticity at 12% (N/mm²)	30,430	
Crushing strength at 12% (N/mm²)	108	

<sup>\*</sup> The following data are based on *Pouteria egregia* and *P. eugeniifolia* which are similar to *P. cuspidata* in appearance and technical properties.



### **BLACK KAKARALLI**

Density category: Very Heavy

**Application:** Heavy carpentry, industrial flooring, shipbuilding, piles and posts, frame construction, dragline/cranes mats

## Commercial Species grouped with Black Kakaralli:

Tauroniro, Shibadan, Moraballi, Purpleheart, Greenheart, Aromata, Tatabu

Air Dry Density at 12% Moisture Content: 1.07

Heartwood: Brown to dark brown

Grain: Straight

Texture: Fine to medium

#### **Processing:**

• Sawing: power required, blunting effect high due to silica

• Drying: moderately difficult to air season

• Machining: difficult due to silica

• Gluing: difficult

Nailing: pre-boring necessary

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	182	
Modulus of elasticity at 12% (N/mm²)	21,635	
Crushing strength at 12% (N/mm²)	77	



#### **TONKA BEAN**

Density category: Very Heavy

**Application:** Sleepers, bridges, flooring, weathered construction, dragline/cranes mats, gearing, heavy carpentry, decorative veneer

## Commercial Species grouped with Tonka Bean:

Tatabu, Shibadan, Bulletwood, Mora, Purpleheart, Greenheart

Air Dry Density at 12% Moisture Content: 1.07

Heartwood: Beige brown with yellow or purplish pink tinge

becoming red brown with age

Grain: Frequently interlocked, sometimes highly

Texture: Fine to medium

#### **Processing:**

Sawing: power required, moderate blunting effect

Drying: must be handled slowly with care; risk of checking and

distortion, high

· Machining: special tools recommended

• Gluing: difficult- special processing needed

Nailing: pre-boring necessary

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	200	
Modulus of elasticity at 12% (N/mm²)	22,000	
Crushing strength at 12% (N/mm²) 105		



#### KAUTA

Density category: Very Heavy

**Application:** Heavy construction (above ground), shingles, house framing, charcoal, underwater marine construction, dragline/cranes mats

## Commercial Species grouped with Kauta:

Bulletwood, Moraballi, Greenheart, Aromata

Air Dry Density at 12% Moisture Content: 1.03

Heartwood: Yellowish brown to brown or dark brown, sometimes

with a reddish tinge

Grain:Straight Texture: Fine

#### **Processing:**

• Sawing: power required, blunting effect: high silica

Drying: air drying reported as easy to moderately difficult, risks

of distortion rated as slight, risks of checking rated as slight

• Machining: difficulties due to hardness and silica content, special

tools recommended

• Nailing: pre-boring necessary

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	173	
Modulus of elasticity at 12% (N/mm²)	17,400	
Crushing strength at 12% (N/mm²)	84	



#### **KAUTABALLI**

Density category: Very Heavy

**Application:** Heavy construction, shingles, house framing, charcoal, underwater marine construction, dragline/cranes mats

#### Commercial Species grouped with Kautaballi:

Bulletwood, Moraballi, Greenheart, Purpleheart, Aromata, Tatabu, Tauroniro

Air Dry Density at 12% Moisture Content: 1.03

Heartwood: Yellowish brown to brown or dark brown, sometimes with a

reddish tinge Grain: Straight Texture: Fine **Processing:** 

Sawing: power required, blunting effect: high silica

Drying: air drying reported as easy to moderately difficult,

risks of distortion rated as slight, risks of checking

rated as slight

Machining: difficulties due to hardness and silica content, special

tools are commended

Nailing: pre-boring necessary

MECHANICAL PROPERTIES	
Bending strength at 12% (N/mm²)	173
Modulus of elasticity at 12% (N/mm²)	17,400
Crushing strength at 12% (N/mm²) 84	



## **MORABUKEA**

Density category: Very Heavy

**Application:** Sleepers, heavy construction, bridge, decking, planking, heavy carpentry, industrial flooring, joinery, boat building (ribs, stern, keels, framing), dragline/cranes mats

#### **Commercial Species grouped with Morabukea:**

Mora, Shibadan, Purpleheart, Moraballi, Greenheart, Aromata, Tatabu

Air Dry Density at 12% Moisture Content: 1.03

Heartwood: Pinkish brown or reddish brown to dark brown with paler streaks

Grain: Straight, often interlocked, sometimes irregular or wavy

Texture: Rather fine to moderately coarse

#### **Processing:**

Sawing: power required, fairly difficult, tendency to spring

Drying: slow drying and careful drying required to prevent degrade

• Machining: difficulty due to hardness and interlocked grain

• Gluing: special precautions needed

• Nailing: good holding of nails pre-boring necessary

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	176	
Modulus of elasticity at 12% (N/mm²)	21,910	
Crushing strength at 12% (N/mm²)	94	



## LIMONABALLI

Density category: Heavy

**Application:** House framing, wall panels, flooring, turnery, joinery, dragline/cranes mats

## Commercial Species grouped with Limonaballi:

Korokororo, Wamara, Greenheart, Aromata, Tatabu, Shibadan, Mora, Wallaba, Purpleheart.

Air Dry Density at 12% Moisture Content: 0.95 Heartwood: Pale yellowish brown to dark brown

Grain: Straight interlocked

Texture: Fine

#### **Processing:**

• Sawing: power required, blunting effect because of silica content

Drying: air drying easy to moderate, some checking
 Machining: moderate to difficult due to silica content

Nailing: pre-boring necessary

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	179	
Modulus of elasticity at 12% (N/mm²)	19,515	
Crushing strength at 12% (N/mm²)	79	



#### **BURADA**

Density category: Heavy

**Application:** Marine construction (submerged), ship keels, sleepers (treated), heavy construction, flooring, dragline/cranes mats

#### Commercial Species grouped with Burada:

Locust, Kabukalli, Purpleheart, Wallaba, Tauroniro, Greenheart

Air Dry Density at 12% Moisture Content: 0.89

Heartwood: Light brown, or yellowish pink brown

Grain: Generally straight sometimes slightly interlocked

Texture: Fine

#### **Processing:**

Sawing: power required , blunting effect: high silica

• Drying: rapid air drying prior to kiln drying is recommended, risk of

distortion moderate, risk of checking slight, possible risk of

case hardening

Machining: special tools recommended

Nailing: pre-boring necessary

Finishing: moderate

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	157	
Modulus of elasticity at 12% (N/mm²)	16,500	
Crushing strength at 12% (N/mm²)	86	



## **ITIKIBOROBALLI**

Density category: Heavy

**Application:** Inlay, cabinet work, walking sticks, parquet flooring, bagpipes, violins, turnery, fine furniture, cutlery, marquetry, musical instruments, interior trim, dragline/cranes mats

#### Commercial Species grouped with <u>Itikiboroballi</u>:

Locust, Purpleheart, Aromata, Greenheart, Wallaba, Kabukalli, Wamara

Air Dry Density at 12% Moisture Content: 0.89

Heartwood: Chocolate brown to pale reddish brown or purplish brown, occasionally marked by dark olive or purplish brown stripes

Grain: Generally straight but may be variable

Texture: Medium to very fine

#### **Processing:**

Sawing: power required

Drying: slow

• Machining: difficult due to hardness-power required

Gluing: N/A

Nailing: pre-boring necessary

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	163	
Modulus of elasticity at 12% (N/mm²)	23,630	
Crushing strength at 12% (N/mm²)	85	



### **WINA KAKARALLI**

Density category: Heavy

**Application:** Pile timbers, beams heavy carpentry (construction), heavy flooring, tool handles sporting goods, frame construction exterior joinery, sliced veneer, stairs, ship keels and beams, sleepers, dragline/cranes mats

#### Commercial Species grouped with Wina Kakaralli:

Shibadan, Tauroniro, Moraballi, Greenheart, Aromata, Tatabu, Purpleheart

Air Dry Density at 12% Moisture Content: 0.86-0.96\*

Heartwood: Red brown with lighter veins

Grain:Straight

Texture: Rather fine to medium

#### **Processing:**

Sawing: power required; somewhat difficult, blunting effect;

moderate

Drying: generally good, risks of distortion and checking

moderate

Machining: moderately difficult; some tearing may occur in planing

because of interlocked grain

Gluing: good

Nailing: pre-boring necessary

Finishing: good

\*Data from two different reference sources

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	136—157	
Modulus of elasticity at 12% (N/mm²)	16,700 - 17,640	
Crushing strength at 12% (N/mm²)	59—78	



#### **FUKADI**

Density category: Heavy

**Application:** Cabinet work, furniture, general construction, interior and exterior joinery, turnery, sleepers, plywood, dragline/cranes mats

## Commercial Species grouped with Fukadi:

Locust, Kabukalli, Wallaba, Purpleheart, Greenheart, Mora

Air Dry Density at 12% Moisture Content: 0.84

Heartwood: Light to brown to light creamy brown often with

darker streaks

Grain: Straight to roey

Texture: Medium

#### **Processing:**

Sawing: power required, somewhat difficult, blunting effect

moderate

Drying: generally good, checking and distortion moderate

• Machining: moderately difficult; some tearing may occur in

planing because of interlocked grain

• Gluing: good

Nailing: pre-boring necessary

• Finishing: good may require little sanding

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	143	
Modulus of elasticity at 12% (N/mm²)	17,760	
Crushing strength at 12% (N/mm²)	71	

## **Medium density species**

Common Name	International Trade Name	Botanical/ Scientific Name	Density g/cm³
Cow Wood	Tatajuba	Bagassa guianensis	0.80
Darina	Angelim	Hymenolobium spp	0.75
Manni	Santa Maria	Symphonia globulifera	0.72
Suya	Suya, Pajura	Pouteria speciosa	0.70-0.71*

<sup>\*</sup>Data from two different reference sources



## **COW WOOD**

Density category: Medium

**Application:** Light construction, paneling, turnery, boxes and crates, furniture components, tool components

#### Commercial Species grouped with Cow Wood:

Locust, Kabukalli, Wallaba, Shibadan, Crabwood

Air Dry Density at 12% Moisture Content: 0.80

Heartwood: Yellow becoming dark brown on exposure

Grain: Frequently but slightly interlocked

Texture: Medium to coarse

#### **Processing:**

Sawing: power required, blunting effect: very slight

Drying: no important problems, movement in service low

Machining: not difficult or difficulties can occur when highly

interlocked grain is present

• Gluing: good

• Nailing: good holding of nails, at times pre-boring necessary

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	121	
Modulus of elasticity at 12% (N/mm²)	17,300	
Crushing strength at 12% (N/mm²)	78	



#### DARINA

Density category: Medium

**Application:** General construction (flooring, ceiling etc), paneling, turnery, boxes and crates, furniture components

## Commercial Species grouped with Darina:

Dakama, Suya, Determa, Hububalli

Air Dry Density at 12% Moisture Content: 0.75 Heartwood: Dark yellow brown to light brown

Grain: Straight to interlocked

Texture: Coarse

#### **Processing:**

Sawing: easy

• Drying: moderately difficult to air-season; fast to moderate

rate; slight checking

Machining: easyGluing: easyNailing: N/AFinishing: smooth

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	121	
Modulus of elasticity at 12% (N/mm²)	14,135	
Crushing strength at 12% (N/mm²)	62	



#### MANNI

Density category: Medium

**Application:** Interior and exterior furniture components, flooring, general construction, interior fittings, plywood, carpentry, cooperage, sleepers

## Commercial Species grouped with Manni:

Dakama, Suya, Determa, Tauroniro

Air Dry Density at 12% Moisture Content: 0.72

Heartwood: Beige brown with yellow green or orange tinge

Grain: Mostly straight, sometimes irregular

Texture: Medium

#### **Processing:**

Sawing: easy

Drying: requires care, risks of distortion more or less high,

risks of checking more or less high

Machining: easyGluing: good

Nailing: good holding of nails

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	113	
Modulus of elasticity at 12% (N/mm²)	12,630	
Crushing strength at 12% (N/mm²)	58	



SUYA

Density category: Medium

**Application:** Utility plywood, boxes and crates, interior joinery light

furniture, light construction, carpentry

## **Commercial Species grouped with Maporokon:**

White Cedar, Yellow Silverballi, Crabwood

Air Dry Density at 12% Moisture Content: 0.67

Heartwood: Pinkish brown with occasionally darker streaks or

zones of straw in colour

Grain: Straight to wavy or interlocked

Texture: Coarse

#### **Processing:**

Sawing: easy

• Drying: blunting effect very slight rapid but careful stacking is

required

· Machining: not difficult

• Gluing: good

Nailing: good holding of nails

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	95	
Modulus of elasticity at 12% (N/mm²)	11,800	
Crushing strength at 12% (N/mm²)	53	

## **Light To Very Light Species**

Common Name	International Trade Name	Botanical/ Scientific Name	Density g/cm <sup>3</sup>
Kurokai	Kurokai, Breu	Protium decandrum	0.64
Maho	Kobe	Sterculia spp.	0.64
Muniridan	Muniridan	Siparuna spp	0.63
Korokororo	Tento	Ormosia coutinhoi	0.62
Wadara	Tauari	Couratari spp.	0.62
Iteballi	Iteballi, Quaruba	Vochysia spp.	0.58-0.62*
Haiariballi	Haiariballi	Alexa imperatricis	0.51
Dalli	Virola	Virola spp	0.46
Futui	Gobaja, Para-Para	Jacaranda copaia	0.43
Duka	N/A	Tapirira marchandii	0.40-0.48*

<sup>\*</sup>Data from two different reference sources



#### KUROKAI

Density category: Light

**Application:** Furniture, house framing, plywood, interior joinery, interior fittings, veneer, light carpentry, moulding

## Commercial Species grouped with Kurokai:

Determa, Yellow Silverballi, White Silverballi, Crabwood, White Cedar

Air Dry Density at 12% Moisture Content: 0.64

Heartwood: Pinkish brown sometimes with dark reddish brown

irregularly spaced streaks

Grain: Straight or shallowly interlocked

Texture: Fine

#### **Processing:**

Sawing: power required

• Drying: fairly rapid, risks of distortion more or less high, risk of

checking more or less high

· Machining: no important difficulties

• Gluing: variable

Nailing: pre-boring necessary

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	110	
Modulus of elasticity at 12% (N/mm²)	12,890	
Crushing strength at 12% (N/mm²)	61	



#### **MAHO**

Density category: Light

**Application:** Plywood, Interior joinery, boxes and crates interior trim, light carpentry, blackboards, particle board, paper, pulp formwork, furniture components, coffins

## Commercial Species grouped with Maho:

Yellow Silverballi, Simarupa, Ulu

Air Dry Density at 12% Moisture Content: 0.64

Heartwood: Variable in colour, pink grey, ochre beige or light reddish

brown

Grain: Generally straight

Texture: Coarse

## **Processing:**

Sawing: easy, blunting effect very slight

Drying: must be handled slowly

• Machining: not difficult; wooly surface; sharp cutters recommended

• Gluing: good

Nailing: good holding of nails

Finishing: filling required

MECHANICAL PROPERTIES		
Bending strength at 12% (N/mm²)	104	
Modulus of elasticity at 12% (N/mm²)	12,650	
Crushing strength at 12% (N/mm²)	55	



#### MUNIRIDAN

Density category: Light

**Application:** Interior and exterior furniture components, flooring, general construction, interior fittings, plywood, carpentry, cooperage, sleepers

## Commercial Species grouped with Manni:

Dakama, Suya, Determa, Tauroniro

Air Dry Density at 12% Moisture Content: 0.72

Heartwood: Beige brown with yellow green or orange tinge

Grain: Mostly straight, sometimes irregular

Texture: Medium

#### **Processing:**

Sawing: easy

• Drying: requires care, risks of distortion more or less high,

risks of checking more or less high

Machining: easyGluing: good

Nailing: good holding of nails

MECHANICAL PROPERTIES	
Bending strength at 12% (N/mm²)	113
Modulus of elasticity at 12% (N/mm²)	12,630
Crushing strength at 12% (N/mm²)	58



## KOROKORORO

Density category: Light

**Application:** Light construction, furniture, light carpentry, matches, moulding, turnery

## Commercial Species grouped with Korokororo:

Yellow Silverballi, Crabwood, White Cedar

Air Dry Density at 12% Moisture Content: 0.62

Heartwood: Dark brown to yellowish brown with dark striping and

sometimes a pinkish tinge

Grain:Straight to moderately interlocked roey

Texture: Coarse

#### **Processing:**

Sawing: easy, blunting effect very slightDrying: seasoning moderately difficult

Machining: easily worked, interlocked grain may be a problem

Gluing: good

• Nailing: good holding of nails

MECHANICAL PROPERTIES	
Bending strength at 12% (N/mm²)	95
Modulus of elasticity at 12% (N/mm²)	11,859
Crushing strength at 12% (N/mm²)	47



#### WADARA

Density category: Light

**Application:** Interior joinery, plywood, exterior joinery (with treatment), light furniture, moulding, light construction, boxes and crates, formwork, toys, flooring

## **Commercial Species grouped with Wadara:**

Yellow Silverballi, White Cedar, Crabwood, Simarupa, Red Cedar

Air Dry Density at 12% Moisture Content: 0.62

Heartwood: Variable cream white to light beige with pinkish yellow tinge

Grain: Generally straight, sometimes roey

Texture: Medium

#### **Processing:**

Sawing: easy, blunting effect; moderate to high silica

• Drying: no important problems, risks of distortion very slight,

risks of checking very slight, movement in service

medium

Machining: not difficult or difficulties could occur when highly

interlocked grain is present

Gluing: good

Nailing: good holding

MECHANICAL PROPERTIES	
Bending strength at 12% (N/mm²)	96
Modulus of elasticity at 12% (N/mm²)	11,700
Crushing strength at 12% (N/mm²)	48



#### **ITEBALLI**

Density category: Light

**Application:** Boxes and crates, utility plywood, turnery, moulding wainscoting, light carpentry, upholstered furniture framing

## Commercial Species grouped with Iteballi:

Determa, White Cedar, Ulu, Baromalli

Air Dry Density at 12% Moisture Content: 0.58-0.62\*

Heartwood: Pale pink brown darkening to golden brown often with

yellow stripes

Grain: Generally straight to slightly interlocked

Texture: Rather coarse

#### **Processing:**

Sawing: easy, wooly surface, blunting effect very slight

Drying: kiln-drying difficult and slow, quarter sawing and slow

drying are recommended

· Machining: special tools recommended

• Gluing: good

Nailing: good holding of nails

MECHANICAL PROPERTIES	
Bending strength at 12% (N/mm²)	78-81
Modulus of elasticity at 12% (N/mm²)	9179-9700
Crushing strength at 12% (N/mm²)	43-45



## HAIARIBALLI

Density category: Light

**Application:** Interior joinery, furniture, boxes and crates, light carpentry, plywood, veneer, interior trim, upholstered furniture framing

## Commercial Species grouped with Haiariballi:

Red Cedar, Baradan, Dukali, Simarupa

Air Dry Density at 12% Moisture Content: 0.51

Heartwood: Brownish yellow, occasionally somewhat darker

Grain:Generally straight
Texture: Rather coarse

#### **Processing:**

Sawing: easy, logs sometimes split in felling, blunting effect very

slight

Drying: difficultMachining: easy

Gluing: good

Nailing: good holding of nails

MECHANICAL PROPERTIES	
Bending strength at 12% (N/mm²)	73
Modulus of elasticity at 12% (N/mm²)	10,890
Crushing strength at 12% (N/mm²)	39



DALLI

Density category: Very Light

**Application:** Plywood, interior joinery, moulding, boxes and crates, matches, light carpentry, particle board, fiber board, upholstered furniture framing, cigar boxes and coffins

## Commercial Species grouped with Dalli:

Red Cedar, Baradan, Dukali, Simarupa, Silverballi, White Cedar

Air Dry Density at 12% Moisture Content: 0.46

Heartwood: Beige to pale brown

Grain: Straight
Texture: Medium

#### **Processing:**

Sawing: easy, blunting effect very slight

• Drying: reported moderately difficult, requires care

Machining: goodGluing: good

Nailing: good holding of nails

MECHANICAL PROPERTIES	
Bending strength at 12% (N/mm²)	78
Modulus of elasticity at 12% (N/mm²)	10,070
Crushing strength at 12% (N/mm²)	40



#### **FUTUI**

Density category: Very Light

**Application:** Plywood (core), block board, moulding, boxes and crates, matches, toys, interior joinery, upholstered furniture framing, broom stick

#### Commercial Species grouped with Futui:

Red Cedar, Baradan, Corkwood, Simarupa, Ulu, Kereti Silverballi

Air Dry Density at 12% Moisture Content: 0.43

Heartwood: Yellowish white or pinkish white with streaks

Grain: Straight

Texture: Medium to coarse

#### **Processing:**

Sawing: easy, risk of splitting wooly surfaces, presence of more

or less internal stresses, blunting effect very slight

Drying: easy and rapid, movement in service medium to large

• Machining: easy but the cutters have to be kept sharp to avoid

wooliness

Gluing: good

Nailing: poor holding of nails

MECHANICAL PROPERTIES	
Bending strength at 12% (N/mm²)	60
Modulus of elasticity at 12% (N/mm²)	89,000
Crushing strength at 12% (N/mm²)	31



#### DUKA

Density category: Very Light

**Application:** Used locally for interior construction, upholstered

furniture framing, boxes, Plywood

## Commercial Species grouped with <u>Duka</u>:

Red Cedar, Baradan, Dukali, Simarupa, Silverballi

Air Dry Density at 12% Moisture Content: 0.40-0.48

Heartwood: Off white to pale cream pinkish

Grain: Straight

Texture: Fairly Fine

#### **Processing:**

Sawing: N/A

Drying: N/A

Machining: N/A

Gluing: N/ANailing: N/A

• Finishing: N/A

MECHANICAL PROPERTIES	
Bending strength at 12% (N/mm²)	N/A
Modulus of elasticity at 12% (N/mm²)	N/A
Crushing strength at 12% (N/mm²)	N/A

#### KILN DRYING

Kiln dried lumber is a standard in the lumber industry because dried lumber is generally prepared for manufacture into a finished product. As most valuable lumber is used within an enclosed environment-such as a home or place of business - the lumber must be suitably dried to prevent movement in service. For example, lumber dried incompletely and then manufactured into flooring will shrink and deform as it gradually loses moisture to the surrounding environment.

Additionally major International markets such as the EU and North America require various species, thicknesses, lengths, and widths, however the one process which often is necessary in the preparation of any lumber prior to entering these markets is kiln drying.

#### **Benefits of Kiln Drying**

- Increased Profitability
- Kiln drying completely sterilizes the material and kills any insects or microbes present, which can be especially important for interior application.
- · Reduces weight of lumber.
- Minimizes shrinkage, hardens pitch, reduces warping and improves its workability; lumber becomes more receptive to the use of glues, fasteners, and bonding agents.
- Kiln drying lumber increases the strength of the lumber. Kiln dried lumber is stronger (over 2x) and stiffer (nearly 2x) than green lumber.



Picture of a locally constructed Solar Kiln.

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We target: forest operatives, students (forestry & environmental science), representatives of communities, representatives of environmental nongovernment, and staffs of public agencies



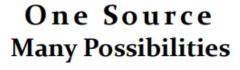


#### Contact Us:

Forestry Training Centre Incorporated 17 Access Road, Kingston, Georgetown, Guyana Tel: (592) 223-5061/62 Facsimile: (592) 223-5061

> E-mail: <u>forestrytraining@gmail.com</u>; gemar@guyana.net.gy









#### Wood Species

- Black Kakaralli
- Fukadi
- Limonaballi
- Mora
- Darina
- Iteballi
- Muniridan
- Tonka Bean
- Itibororalli
- Kurokai
- Wadara



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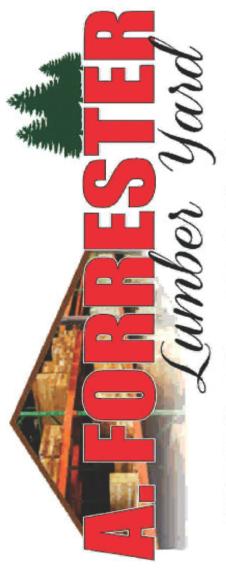
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BSc. Forestry MSc. Forestry

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Wood-Tech Lumberyard (WTL) was established in 2008, starting with buying and selling of rough and dressed lumber for local consumption. In 2010, WTL saw the opportunity to export round logs to China and took advantage of this opportunity. WTL has since expanded its market to China with other products to date. With continued persistence WTL gained access to its own State Forest Permit and have managed to secure a reliable supply of logs for its operations by gaining access to over 20,000 acres of tropical forest state land. Here WTL diligently implements sustainable forest harvesting practices for a greener business environment. In keeping with our vision, WTL have moved fully into downstream processing in 2013, producing competitive products in terms of quality that meets the requirements of international standards on the local and international markets. It is essential for the full utilization of the orest resource, to maintain the option of log export in order to realize maximum returns and fully utilize the

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#### Cuyana/European Union Forest Law Enforcement Covernance and Trade (FLECT)



#### What is FLEGT?

FLEGT stands for Forest Law Enforcement, Governance and Trade. The EU's FLEGT Action Plan was established in 2003. It aims to reduce illegal logging by strengthening sustainable and legal forest management, improving governance and promoting trade in legally produced timber.

What is a Voluntary Partnership Agreement (VPA)?

VPAs are a central element of the European Union's (EU) strategy in the fight against illegal logging. A VPA is a Bilateral Trade Agreement between the EU and a timber-exporting country (in this case Guyana).

#### Guyana/EU & the

**Guyana Formally commenced** negotiations with the EU in December 2012. Timber exporting countries like Guyana may voluntarily enter the VPA. However once a VPA is entered into

force, it becomes legally binding on both sides.

#### Aims of the VPA:-

- To guarantee that forest exports from Guyana comes from legal sources
- To improve forest governance and forest regulations

#### Benefits of a VPA:-

- Promotes stakeholder participation in decision making
- Contributes to forest sector development objectives

#### Under the VPA:-

- The EU provides support to timber producing countries such as Guyana to improve the forest sector and associated trade in forest produce
- Guyana builds on and improves on existing systems within the forest sector





VPA Partner Countries of the World as at December 2015: Cameroon, Central African Republic, Ghana, Indonesia, Liberia, Republic of Congo *Negotiating:* Cote D'Ivoire, Democratic Republic of Congo, Gabon, Guyana, Honduras, Laos, Malaysia, Thailand, Vietnam.





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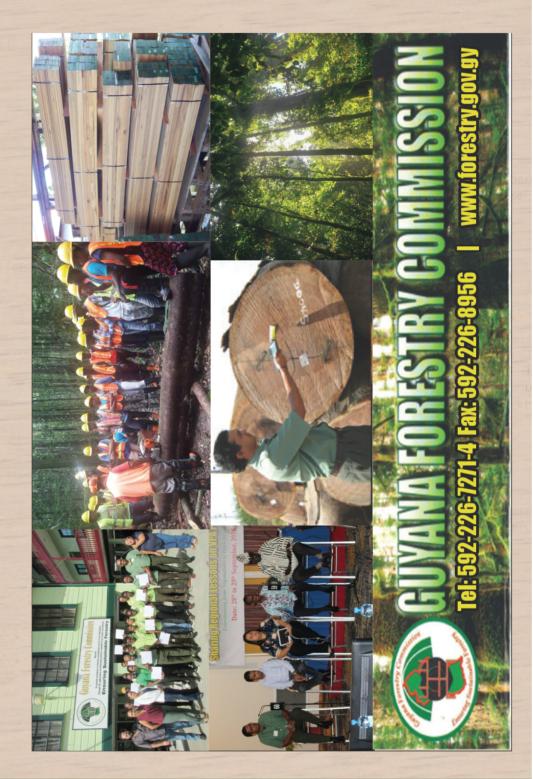
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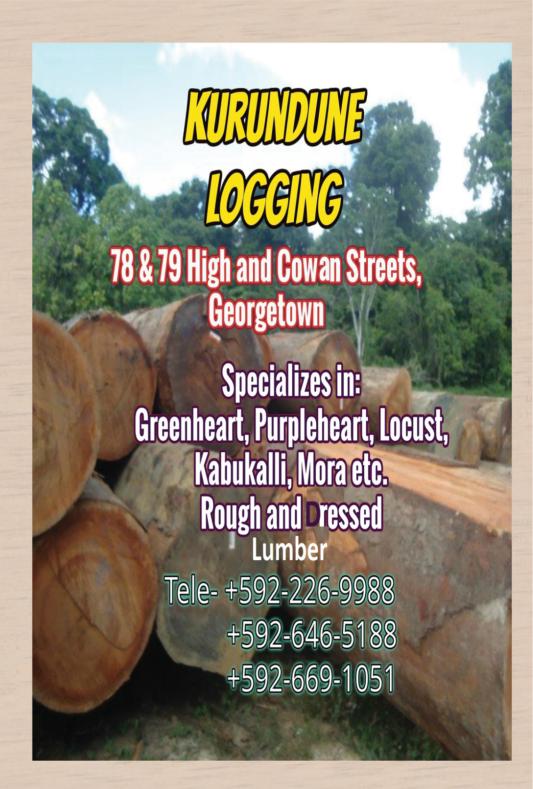
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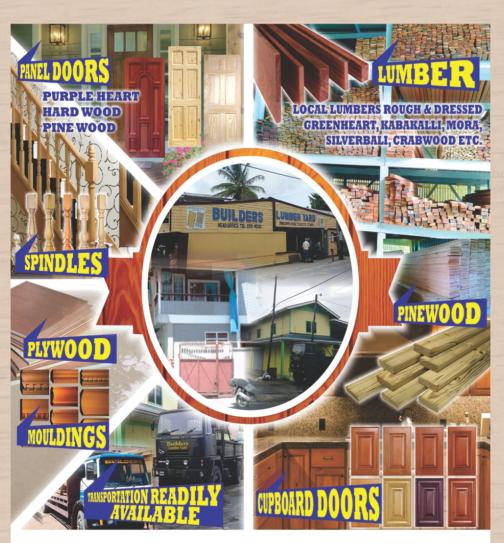
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The VPA acts as a tool and can be used to foster discussions between a wide range of stakeholders with overlapping interests in the timber industry. These discussions can lead to cohesion between agencies within the different sectors. Typical examples of these stakeholders are Government, Private sector and Civil society. In these examples each group can be seen as beneficiaries in different ways with the vision of benefiting all stakeholders as well as having national interest.

#### Areas of benefit for Government:-

- Realise greater economic value of the forest resource.
- Enforce existing legislation.
- Raise funds for national coffers
- Stem loss of revenue from illegal logging.
- Support and/or finance reform of the forest sector.
- Ensure accountability and transparency in decision making (land-use allocation).
- Improve country image and sector credibility.

#### Private sector on the other hand can realise benefits:-

- Secure and expand markets.
- Level the playing field by reducing unfair competition in the forest sector by enabling small-scale operators to compete with big companies.
- Clarify requirements and enhance control procedures to foster greater transparency.
- Foster better relationships with communities.
- Confirm the legal status of all operators.

#### Whilst Civil Society may aspire to:-

- Provide a platform for stakeholder participation.
- Recognise the rights of Indigenous Peoples.
- Recognise user rights and operators' responsibility to communities and overlapping sectors.
- Improve flow of benefits to
- Improve access to information in the forest sector to enable sharing.
- Provision of resources for education, training and advancement in skills.
- Provision of scope for employment.
- Provision of opportunities for communities to become self-sufficient in managing their resources.



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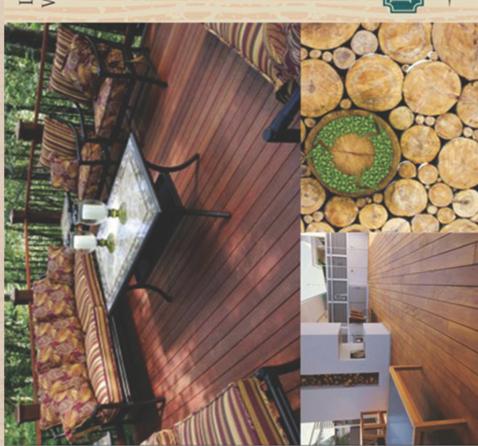
Fiscal Incentives are offered by the Government of Guyana to encourage investment in the following sectors:

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#### REFERENCE

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