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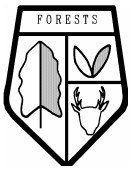

Government of the Union of Myanmar
Ministry of Forestry
Forest Department

Physical and Mechanical Properties of Zaungbale (*Lagerstroemia Villosa* Wall.)

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ဇောင်းပလေးသစ်၏ အရည်အချင်းနှင့် အင်အားကို လေ့လာခြင်း။

ဦးစိုးတင့်၊ U Soe Tint, B.Sc,[For], [Rgn.], M.Sc. [ANU] Divisional Head,
ဌာနမှူး
သစ်တောသုတေသနဌာန။

စာတမ်းအကျဉ်းချုပ်

ဇောင်းပလေးသစ်သည် ပဲခူးရိုးမ သစ်တောများတွင် မြောက်များစွာပေါက်ရောက်ပါသည်။ ပေါက်ရောက်နှုန်းမှာ သစ်တော သယံဇာတ စီမံကိန်း၏ နောက်ဆုံးကောက်ယူရရှိသော စာရင်းအရ၊ တဧကလျှင် (၁.၈၅) ပင်နှုန်း ရှိပါသည်။ တဧကလျှင် (၁.၄၂) ပင်နှုန်း ပေါက်ရောက်သော လယ်ဇ သစ်ထက်ပင် ပေါက်ရောက်မှု ကောင်းပါသည်။ သို့သော် ၄င်းသစ်မှာ အသုံးချမှုနည်းပါးခဲ့ပါသည်။ ထိုကဲ့သို့ လူသုံးနည်းသော ဇောင်းပလေးသစ်၏ အရည်အချင်းနှင့် အင်အားများကို စမ်းသပ်ရှာဖွေ၍သင့်တော်သော အသုံးချမှု အလားအလာများကို တင်ပြထားပါသည်။

Physical and Mechanical Properties of Zaungbale (*Lagerstroemia Villosa* Wall.)

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Abstract

Zaungbale trees occur in large number in the forests of Pegu Yoma. According to the latest forest inventory data collected by the Forest National Inventory Project, the growing stock is found to be (1.85) tree per acre. This is even greater than the stocking of Leza (*Lagerstroemia tomentosa* Presl) which is (1.42) tree per acre. Inspite of this Zaungbale is a comparatively lesser known species as far as utilization is concerned. The investigation made on the physical and mechanical properties is with the object of finding the possible use of the species.

Contents

1. Introduction

An attempt to promote the potential end-uses of the lesser-known species of Burma has been initiated by the Forest Research Institute since 1982. Four species; namely Leze *(Lagerstroemia tomentosa),*Lein *(Terminalia pyriflora),* Myaukngo *(Duabanga grandiflora)* and Rubber wood *(Hevea brasiliensis)* have been studied for their physical and mechanical properties and their prospective end-uses were indicated.

In this paper, a fifth species was explored and its potential use discussed. The species studied is Zaungbale *(Lagerstroemia villosa* Wall.)

The forests of Burma are endowed with over a thousand species of woody trees, of which only about fifty species of naturally durable and strong are marketed commercially. (Timber Corporation's Standing Orders for Subordinates). It is hoped that many unextracted lesser-known or little-used species may be placed into appropriated end-uses if their technical properties were known. For example, some non-durable woods may be used as structural timber with preservative treatment when their basic properties such as anatomical, physical and mechanical properties are known. Other properties such as response to seasoning, preservation treatment, workability, durability and its chemical properties must also be understood. The physical and mechanical properties are investigated in this report and the possible end-uses were proposed.

Any study of these species must consider the available volume in the forests or the investigation is not justified. The Forest Inventory Project of the Forest Department recently completed the work in the East Pegu Yoma area. The number of trees per acre reported in the following Townships (Yedashe, Toungoo, Oktwin, and Pyu) are reproduced below:

1.	Teak	- 5.06*	trees/ acre	15.	Yinma	- 0.10	trees/ acre
2.	Pyinkado	- 5.46*	"	16.	Yemane	- 0.23	"
3.	Kuthan	- 0.14	"	17.	Yindaik	- 0.23	"
4.	Chinyok	- 0.98	"	18.	Yon	- 0.82	"
5.	Sagawa	- 0.01	"	19.	Leza	- 1.42*	"
6.	Sit	- 0.02	"	20.	Lein	- 0.23	"
7.	Zaungbale	- 1.85	"	21.	Thadi	- 1.79	"
8.	Tamalan	- 0.02	"	22.	Thabye	- 0.32	"
9.	Taukkyan	- 0.28	"	23.	Thinwin	- 0.66	"
10.	Nabe	- 0.48	"	24.	In	- 1.42*	"
11.	Hnaw	- 0.08	"	25.	Ingyin	- 0.32	"
12.	Panga	- 0.64	"	26.	Kanyin	- 0.30	"
13.	Binga	- 2.97*	"	27.	Padauk	- 0.16	"
14.	Myaukngo	- 0.43	"	28.	Pyinma	- 0.62	"

(National Forest Inventory data, Forest Department)

Observing the above data, it can be seen that, apart from commercially important species such as teak, Pyinkado, and Thadi, the stocking of Zaungbale is promising. The trees per acre of Zaungbale is higher than most of the other lesser-known species but is less than Binga. Therefore, it is considered that this species is worth further research. If this species can be but into wider use, the following advantages will be obtained.

(1). The export volume of timber for domestic use and foreign trade will be increased.

(2). The consumer price for timber will be reduced as the extraction cost per acre will be spread over the greater volume produced.

(3). The species composition of the remaining forest will be improved with the removal of these less valuable species.

2. Literature Review

2.1. The Tree

Zaungbale is a tree reaching of a height of 100' and a girth of 8' at breast high in favourable localities. In average site conditions, it grows to a height of 80' and a girth of 5'-6'. A clear bole of 25' is available. It grows in large quantity in the Pegu Yoma areas. It is common in the deciduous forest type. It is said to occur in the Shan Hills up to 3000' above the sea level. It reproduced very freely by root suckers which may be one of the reasons it occurs abundently in the Pegu Yoma areas. (Gamble 1972, Pearson 1932).

2.2. The Timber

2.2.1. Colour The sapwood is yellowish grey and occupies a large volume in proportion to the heartwood. Sometimes it is pale yellowish grey.
The heartwood is dark greyish brown in the centre of the tree and sometimes it is light-brownish grey to light yellowish brown in the outter portion of the heartwood.
The annual rings are faintly marked and there are 5-7 rings per inch.

2.2.2. Grain Normally it is straight grained, but occasionally wavy or cross grained. Air seasoning may result in the twisting of the piece especially in square timber. It is lustrous, but without odour or taste, and is medium coarse textured. (Pearson & Brown 1932).

2.2.3. Specific gravity It is moderately heavy. The specific gravity is 0.69 and weighs 60 lb per cubic foot green and 45 lb per cubic foot air dry.

2.2.4. Strength It is a moderately strong and hard timber and is similar to Teak and Kanyin but is superior to Myaukngo, Sagwa, Taungthayet and Yemane.

2.2.5. Movement Large in shrinkage, but comparable to Kanyin and In. Radially 4.2% and tangentially 7.6 % respectively.

2.2.6. Seasoning Said to be difficult to air season. Fibre twisting being the cause. Kiln seasoning with careful management is the remedy. Surface checking occurs in air seasoning. End split and star shakes occur as logs dry out. (Pearson and Brown, 1932)

2.2.7. Working Properties - Saws nicely in green state but the saw runs out of line when dry. Works to a good surface but occasionally cross grain may be encountered.

2.2.8. Durability and Preservative Treatment

Fairly durable, but said to be difficult to treat in preservative treatment. (Rodger 1963, Pearson & Brown, 1932).

3. Materials and Method

Five trees of marketable size (5' and over girth at breast height) were collected from Taungnyo Reserve Forest in Yamethin Township.The samples were authenticated taxonomically and anatomically. The strength data herein, while based on these samples, serve to provide estimates of species means. Nevertheless, as strength tests on Zaungbale have not been carried out before, these data will be of great value in determining the use of this species.

Trees were selected at random and the preparation, the size specification of the samples, and the testing procedure followed were as close as possible to the " American Society for Testing and Materials" (A.S.T.M. Standards, namely " D-143-Standard Methods of Testing Small Clear Specimens of Timber" (Reapproved 1965).

3.1. Physical Properties

Twelve samples of size 1" x 1" x 4" were taken at random from the samples for the determination of radial and tangential shrinkage. Eight samples of size 2" x 2" x 6" were taken to determine the volumetric shrinkage. Water displacement method was used to determine the volume of the samples in the determination of the specific gravity. Measurements were read nearest to the thousandth of an inch and weighed to the thousandth of a gram. The moisture contents were determined by the oven dry method.

3.2. Mechanical Properties

Size of the specimens for various test were shown in Table (1) below. Cleavage test and Impact tests were not carried out as the proper fittings for these tests and equipment for impact test are not available. The Avery Universal Testing machine was used for the rest of the tests. Tension parallel to the grain was not also done because of lack of facilities.

Table (1). **Dimensions of test specimens for various test.**

Sir. No.	Test	Size of specimens
1.	Static Bending	2" x 2" x 30"
2.	Compression parallel to grain	2" x 2" x 8"
3.	Compression perpendicular to grain	2" x 2" x 6"
4.	Hardness	2" x 2" x 6"
5.	Shear	2" x 2" x 2½"

The principal tests made and the properties evaluated are as follows: -

(1) Static Bending
  (i) Fibre Stress at Proportional Limit F.S.@ P.L.
  (ii) Modulus of Rupture M.R.
  (iii) Modulus of Elasticity M.E.

(2) Compression parallel to the grain.
  (i) Fibre Stress at Proportional Limit F.S.@ P.L.
  (ii) Maximum Crushing stress

(3) Compression perpendicular to the grain.
  (i) Fibre Stress at Proportional Limit F.S.@ P.L.

(4) Hardness
  (i) Radial
  (ii) Tangential
  (iii) End.

(5) Shear
  (i) Radial
  (ii) Tangential

4. Results

4.1. Physical Properties

Results of the tests on the physical properties of Zaungbale are presented in Table 2. The properties given are the specific gravity, weight per cubic foot, and shrinkage percent from green to ovendry. The properties of some commercially important species as Teak, Pyinkado, Kanyin and In are also given for comparison. Some other secondary species are also compared together with the lesser-known species such as Leza, Lein and Myaukngo.

4.2. Mechanical Properties

The mechanical properties of Zaungbale tested are given in Table 3. The figures are the mean value of the species. Tests were made for both green and dry conditions of the specimens. The mechanical properties of some other commercially important species and other secondary species are also stated and compared.

The data given in Table 4 compares Teak as to the other properties of twenty species including Zaungbale, with suitability for different purposes. This table provides and easy comparison among species and was prepared according to the method stated by Limaye and Seaman.

Table (2) Physical Properties of Zaungbale and Other Species.

Name		Seasoning	Moisture Content %	Specific Gravity	Weight lb per c.ft	Shrinkage percent			Shrinkage ratio Tan/Rd	Remark
Local	Botanical					Radial	Tangent	Volume		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Zaungbale	*Lagerstroemia*	Green	39.1	.61	60.8	4.2	7.6	12.5	1.81	
	villosa	Air Dry	15.8	.69	45.4	-	-	-	-	
Teak	*Tectona*	Air Dry	49.4	.59	55.0	2.1	3.3	6.8	1.57	
	Grandis	Green	14.1	.57	40.0	-	-	-	-	
Pyinkado	*Xylia*	Green	48.6	.78	72.0	3.3	6.7	11.1	2.03	
	dolabriformis	Air Dry	10.3	.82	56.0	-	-	-	-	
Leza	*Lagerstroemia*	Green	98.2	.52	64.0	4.2	6.4	12.1	1.52	
	tomentosa	Air Dry	10.1	.54	42.0	-	-	-	-	
In	*Dipterocarpus*	Green	50.3	.73	68.0	4.4	9.1	14.0	2.07	
	tuberculatus	Air Dry	19.4	.76	56.0	-	-	-	-	
Kanyin	*Dipterocarpus*	Green	65.7	.66	68.0	4.2	8.9	15.0	2.12	
	turbinatus	Air Dry	14.3	.69	49.0	-	-	-	-	
Pyinma	*Lagerstroemia*	Green	118.1	.52	70.0	4.4	6.8	12.7	1.55	
	speciosa	Air Dry	8.5	.57	38.0	-	-	-	-	
Binga	*Mitragyna*	Green	58.4	.55	55.0	3.8	7.3	12.0	1.92	
	rotundifolia	Air Dry	12.8	.58	41.0	-	-	-	-	
Hanw	*Alina*	Green	81.4	.58	66	2.8	5.6	8.7	2.0	
	coraifolia	Air Dry	12.2	.59	41	-	-	-	-	
Nabe	*Lannea*	Green	94.0	.49	60	3.0	5.4	8.4	1.8	
	grandis	Air Dry	17.0	.49	36	-	-	-	-	
Sagawa	*Michelia*	Green	112.9	.48	57	3.2	5.2	8.2	1.6	
	champaca	Air Dry	8.8	.44	30	-	-	-	-	
Taungthayet	*Swintonia*	Green	58.5	.55	54	3.2	6.0	10.8	1.8	
	floribunda	Air Dry	13.7	.57	41	-	-	-	-	

Table (2) Physical Properties of Zaungbale and Other Species. (Continue)

Name		Seasoning	Moisture Content %	Specific Gravity	Weight lb per c.ft	Shrinkage percent			Shrinkage ratio Tan/Rd	Remark
Local	Botanical					Radial	Tangent	Volume		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Yemane	*Gemlina*	Green	151.2	.42	66	2.4	4.9	8.8	2.0	
	arborea	Air Dry	12.1	.43	30	-	-	-	-	
Kuthan	*Hymenodicty on*	Green	114.8	.42	56	2.4	5.6	9.8	2.3	
	excelsum	Air Dry	6.3	.44	31	-	-	-	-	
Lein	*Terminalia*	Green	75.0	.62	69	4.8	9.1	15.1	1.8	
	pyriflora	Air Dry	16.0	.65	50	-	-	-	-	
Myaukngo	*Duabanga*	Green	110.0	.43	45	3.7	6.6	9.2	1.7	
	grandiflora	Air Dry	12.0	.43	27	-	-	-	-	

Table (3) Mechanical Properties of Zaungbale and Other Species

Species	Seasoning	M.C %	State Bending			Comon. 11 to grain		Comon. per to grain @pL p.s.i.	Hardness			Shear		Remarks
			F.S.@p.L p.s.i..	M.R p.s.i.	M.Ex10^3 p.s.i.	F.S.@p.L p.s.i..	Maxm. crush. p.s.i.		Rad lb	Tang lb	Side lb	Rad p.s.i.	Tang p.s.i.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
Zaungbale	Green	39.1	6560	11395	1775	3433	4865	812	1058	1104	1208	1230	1460	
	Air Dry	15.8	8399	14411	1998	4604	7786	1040	1193	1190	1490	1406	1429	
Teak	Green	49.4	6935	11460	1640	3815	5710	930	980	960	910	990	1080	
	Air Dry	14.1	9425	14465	1830	5385	8350	1280	960	990	860	895	1390	
Pyinkado	Green	48.6	9635	15444	2265	6445	8015	1700	1825	1915	1825	1525	1965	
	Air Dry	10.3	11330	20580	2530	7120	11515	2210	2165	2385	2080	2130	2300	
Leza	Green	98.2	6065	11005	1695	4010	5115	955	985	990	1055	1200	1425	
	Air Dry	12.4	9280	13265	1940	4895	7145	1245	1125	1076	1120	1315	1325	
In	Green	50.3	6990	11595	1754	3670	5640	1220	1420	1420	1455	1195	1345	
	Air Dry	19.4	7205	13925	1964	3540	6785	900	1615	1565	1575	1380	1600	
Kanyin	Green	65.7	6935	11020	2020	3890	5865	950	1020	1010	1060	885	1055	
	Air Dry	14.3	8095	15605	2240	3730	7745	1185	1395	1285	1315	1160	1345	
Pyinma	Green	118.1	5525	8590	1285	3335	4275	1225	1100	1085	1080	1040	1195	
	Air Dry	8.5	6565	13255	1534	5210	7250	1385	1050	1060	1375	1390	1685	
Binga	Green	58.4	6425	10525	1330	4030	5280	990	1075	1055	1230	1190	1300	
	Air Dry	12.8	7695	14030	1603	5710	7525	1345	1165	1255	1580	1460	1445	
Hnaw	Green	81.4	5645	9450	1215	3955	4925	1085	1060	1100	1255	1150	1300	
	Air Dry	12.2	6535	11325	1362	4175	6550	1475	1165	1295	1440	1505	1490	
Nabe	Green	94.0	3290	6065	801	1935	2790	555	700	685	740	740	905	
	Air Dry	17.0	4570	8145	940	2555	3805	845	795	770	870	955	1175	
Sagawa	Green	112.9	4795	8010	1194	2985	4020	630	610	640	640	940	1005	
	Air Dry	8.8	6215	9250	1387	4250	6420	985	760	840	1005	1070	1225	

Table (3) Mechanical Properties of Zaungbale and Other Species. (Continue)

Species	Seasoning	M.C %	State Bending			Comon. 11 to grain		Comon. per to grain @pL p.s.i.	Hardness		Shear			Remarks
			F.S.@p.L p.s.i..	M.R p.s.i.	M.Ex10^3 p.s.i.	F.S.@p.L p.s.i..	Maxm. crush. p.s.i.		Rad lb	Tang lb	Side lb	Rad p.s.i.	Tang p.s.i.	
Taungthayet	Green	58.5	4655	8625	1638	2885	4095	565	750	735	755	1100	1290	
	Air Dry	13.7	6085	11435	1853	3460	5590	865	845	860	1030	1325	1530	
Yemane	Green	151.2	4060	6940	1118	2410	3300	680	755	760	670	890	950	
	Air Dry	12.1	6335	9375	1287	3205	4850	685	490	560	525	1035	1050	
Kuthan	Green	114.8	3325	5585	914	1905	2685	465	505	505	460	815	975	
	Air Dry	6.3	6710	9660	1270	3665	6465	940	600	645	630	890	1030	
Lein	Green	85.2	5470	9880	1690	3165	4875	698	985	1005	995	1120	1295	
	Air Dry	15.6	9730	13560	1995	6290	6770	1095	1286	1295	1220	1395	1775	
Myaukngo	Green	110	4249	7366	1120	2738	3649	432	560	575	638	772	785	
	Air Dry	12	6125	9881	1201	3796	5514	517	586	594	776	932	1237	

Table (4). Relative Suitability of Zaungbale and Other Selected Species as Percentage Strength of Teak.

Sr. No.	Species	Strength as a beam	Stiffness as a beam	Suitability as a post	Retention of Shape	Shear	Hardness	Weight	Remarks
1.	Zaungbale	96	106	91	54	78	97	113	
2.	Teak	100	100	100	100	100	100	100	
3.	Pyinkado	128	135	135	70	155	187	140	
4.	Binga	90	83	92	69	111	107	102	
5.	Didu	45	50	50	90	45	35	55	
6.	Hanw	77	74	81	88	111	110	102	
7.	In	104	110	100	57	105	147	140	
8.	Kanyin	105	125	100	55	90	105	110	
9.	Kuthan	50	55	50	75	75	50	70	
10.	Lein	95	105	100	60	115	100	125	
11.	Letpan	45	45	45	60	55	35	55	
12.	Leza	91	103	95	70	110	104	105	
13.	Myaukngo	64	66	65	76	75	50	67	
14.	Nabe	55	51	51	85	76	76	90	
15.	Pyinma	73	78	76	67	100	110	95	
16.	Sagawa	62	72	69	88	83	68	75	
17.	Sit	85	80	85	75	130	105	95	
18.	Taungmeok	50	55	50	-	65	35	60	
19.	Taungthayet	73	100	80	74	108	77	102	
20.	Yemane	65	65	65	80	95	80	85	

5. Discussion

The weight of Zaungbale in an air dry condition is almost as heavy to Teak, Binga, Hnaw, Kanyin, Leza, and Taungthayet. Obviously it is lighter than Pyinkado and In, but heavier than most of the other species compared.

In terms of shrinkage, Zaungbale has considerable shrinkage. It is similar to In and Kanyin in shrinkage and a little unstable compared to Lein and Letpan. Apart from these species last mentioned, Zaungbale is higher in movement then the other species compared.

In mechanical properties, Zaungbale is obviously weaker than Pyinkado and Kanyin, but on the other hand, it is strong as Teak, Pyinma and Binga in transverse static bending. As a whole it has much higher modulus of rupture compared to other species mentioned in the tables.

In terms of compressive strength parallel to grain, this species is lower than Pyinkado and Teak but equal to Kanyin, and Binga. Comparing it to other species mentioned, it is higher than all.

The compression perpendicular to grain at proportional limit figure for Zaungbale showed that it is lower than Teak, Pyinkado, Leza, Pyinma, Binga and Hnaw. It is almost equal to Kanyin, and Lein, and higher than the rest of the species compared in Table 3.

Zaungblae is as hard as Teak, Kanyin, Leza, and Lein, but lower in hardness than Pyinma, Kanyin, In, Hnaw, and Leza. It is harder than Myaukngo, Sagawa, Tuangthyet, Nabe, Lepan, Taungmeok, Didu, Yemane and Kuthan.

In the case of shear, Zaungbale has a shearing strength equal to Myaukngo, Nabe, and Lein. It is weaker than Teak, Kanyin, Pyinma, In, Binga, Hnaw, Taungthayet, Leza, Lein, Pyinkado and Sit.

6. Conclusion

Zaungbale is a moderately heavy, hard and strong timber. It's relative species Leze which belongs to the same family *Lythraceae,* is most identical in strength value and thus can be used in place of Pyinma as far as strength is concerned. This species has a transverse strength as strong as Teak and therefore, it is hoped that the species can be utilized as beams in place of Teak, but it will need preservative treatment as it is not naturally durable.

This species is stronger than those species such as Binga, Hnaw, Kuthan, Sagawa, Myaukngo, Taungthayet and Yemane. It is weaker than Pyinkado, In and Kanyin but as strong as Leze and Teak.

For use as a post, it is as good as Binga and Leza but inferior to Teak, Kanyin, In and Pyinkado. Care should be taken as the timber is liable to twist because of its twisted fiber.

Movement is great add it is not advisable to use this timber where stability is necessary. As stated, air seasoning of this timber is rather difficult, kiln seasoning with close attention is the solution to proper seasoning. Because of the great movement, it is advisable to saw the logs in the green state.

By observing the physical and mechanical properties of Zaungbale, it can be used as a second class construction timber as post, beams, door and window frames. Carpentry tool handles may be another possible end-use. Construction timber in building can be another possible end-use to its strength properties.

APPENDIX

Botanical Names of Tree Species.

Local Names	Botanical Names
Binga	*Mitragyna rotundifolia* O.Ktze.
Chinyok	*Garnga pinnata* Roxb.
Didu	*Salmalia insignis* Schoot & Endl.
Hnaw	*Adina cordifolia* Hook.f.
In	*Dipterocarpus tuberculatus* Roxb.
Ingyin	*Pentaeme siamensis* (Mig.) Kurz.
Kayin	*Dipterocarpus turbinatus* Gaertn .f.
Kuthan	*Hymenodictyon excelsum* Wall.
Lein	*Terminalia pyriflora* Kurz.
Letpan	*Salmalia malarbarica* Schott & Endl
Leze	*Lagerstroemia tomentosa* Presl.
Myaukngo	*Duabanga grandiflora* Roxb.
Nabe	*Linnea grandis* Engler.
Padauk	*Pterocarpus macrocarpus* Kurz.
Panga	*Terminalia chebula* Retz.
Pyinkado	*Xylia dolabriformis* Benth.
Pyinma	*Lagerstraemia speciosa* Pers.
Rubberwood	*Hevea braziliensis* Muell. Arg.
Sagawa	*Michelia champaca* L.
Sit	*Albizzia procera* Benth.
Tamalan	*Dalbergia oliveri* Gamble.
Taungmeok	*Alstonia scholaris* R.Br.
Taukkyan	*Terminalia tomentosa* W.& A.
Taungthayet	*Swintona floribunda* Griff.
Teak	*Tectona grandis* Linn. f
Thabye	*Eugenia jambolana* Lamk.
Thadi	*Protium serrata* Engler.
Thinwin	*Millettia pendula* Benth.
Thitsi	*Melanorrhoea usitata* Wall.
Yemane	*Gmelina arborea* Roxb.
Yindaik	*Dalbergia cultrata* Grah.
Yinma	*Chukrasia tabularis* A Juss.
Yone	*Anogeissus acuminata* Wall.
Zaungbale	*Lagerstroemia villosa* Wall.

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