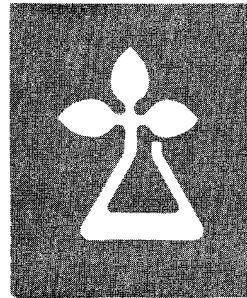


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SEASONING AND HANDLING OF RAMIN<sup>1</sup>

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Abstract

One of the imported woods that is finding increasing use for specific purposes is ramin (Gonystylus spp.). It originates in the Southwest Pacific and has seasoning properties somewhat like oak. Many importers, custom dryers, and users are not aware of the special seasoning and handling requirements of this wood. As a result, some firms have experienced heavy losses. This note brings together suggestions that should greatly reduce or eliminate these losses.

Ramin--Production and Properties

Ramin (pronounced ray-min) is the common name used in the United States for wood from Gonystylus spp., principally G. bancanus growing in Sarawak, Malaysia. Another common name used in Malaya is melawis. The trees grow

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<sup>1</sup>Partly based on information from experienced importers, custom dryers, and users of ramin.

in fresh water swamp forests and have straight, clean boles averaging 60 feet long and 2 feet in diameter near the base. Principal sources are the river valleys of Sarawak and the west coast of Malaya. In the Philippines, G. macrophyllus is common in the primary forests. An undetermined species is fairly comon in the Solomon Islands,

Ramin is an attractive, high-class utility hardwood having about the same weight as sycamore or paper birch. Both the sapwood and the heartwood are white to pale straw in color. Texture is moderately fine and even, the grain straight or slightly interlocked; if carefully handled, the timber has a bright, clear appearance, with no prominent decorative features such as large rays,<sup>2</sup>

The timber seasons with little distortion but has a marked tendency for and splitting and surface checking. Such checking can become serious with 1-1/2-inch and thicker stock. The freshly cut lumber must be dipped in a fungicide to prevent blue stain. The inner bark must be completely removed from logs before sawing because it contains sharp-pointed fibers that may cause skin irritation. Goggles are recommended for sawyers.

Production and marketing of the lumber in Malaysia is under close supervision of that country's Forest Department. Under good practice, the lumber is air dried in carefully stickered piles under shed roofs until it is about 25 percent moisture content (under best practice, between 20 and 25 percent). The stock will surface check and end check excessively if exposed alternately to rain, sun, and drying winds in unsheltered air-drying piles. The ends of all 1-inch and thicker lumber should be smoothly trimmed and coated with a highly moisture-resistant end coating before air drying starts, The logs, green lumber, and lumber not completely air dried often exhibit a strong, unpleasant odor. This disappears as the wood is thoroughly dried, but may appear again if the wood is rewet.

In general, the wood machines cleanly, although it may have a moderate blunting effect on cutting edges. In planing and molding, there is a tendency for quarter-sawn stock to tear occasionally and it my be advisable in some instances to reduce the cutting angle to 20°. Some care is needed to prevent the wood being chipped away as the tool exits in boring and similar operations. There is also some tendency for the wood to split when it is nailed; so if nails are used in assembly, they should not be too large nor placed too close to the ends of the pieces.

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<sup>2</sup>Great Britian Forest Products Research Laboratory, A Handbook of Hardwoods, (Sexond impression) 269 pp., (Britian Information Office, 845 Third Ave., New York, N.Y. 10022).

Average shrinkage values for ramin have not been fully established, but on the basis of data from various sources they are estimated to be approximately as follows:

<u>Moisture change</u>	<u>Radial</u> (Pct.)	<u>Tangential</u> (Pct.)
Green to oven-dry	4.3	8.7
20 percent to 7 percent	2.0	4.0

The shrinkage intersection point is close to 30 percent based upon British data.<sup>2</sup> The shrinkage values are about midway between those for northern and southern red oak.

### Procurement and Handling

Ramin lumber 1 and 1-1/4 inches thick can be handled and seasoned readily with little degradation. One- and one-half-inch lumber and 2-inch squares are more susceptible to seasoning damage but can be handled satisfactorily if extra care is applied. Two-inch and thicker boards are very difficult to season without degrade. Unless a long, carefully controlled air-drying period has been used, such thick stock is likely to have wet cores when received in this country and to be susceptible to damage in shipment and preparation for kiln drying. Therefore 2-inch and thicker ramin probably should not be purchased unless done in close cooperation with the exporting government's forest agencies. It may be well to purchase ramin only through a lumber importer who is able to maintain good liaison with the sources in the Southeast Asia area.

Insofar as possible, ship directly from the source to the United States, or have as few transshipment points as possible. All ship loading, unloading, and transshipment storage should be done with roofed docks. Purchasers should be careful about shipping moisture content during the months of October through March, as this is the Sarawak rainy season.

Solid-piled bundles of lumber can be transported in the open by trucks or rail flatcars, but unless the top bundles are covered, there is likely to be some damage in the top layers of the bundle. The stock should not be taken from the bundles until it can be put directly into carefully controlled seasoning conditions. The placement of partly air-dried stock on stickers on an open air-drying yard, even under pile roofs, is likely to lead to severe damage.

## Moisture Content and Check Inspection

Insofar as possible, all stock purchased should be obtained under specifications to one of the moisture levels indicated previously. As some of the stock already in commercial channels may be at higher moisture levels, it would be wise to inspect all incoming stock for moisture content upon receipt. This should be done with both oven and electric moisture meter tests<sup>3</sup> until adequate calibration curves are developed for use of the meter directly.

For stock thicker than 5/4, a moisture meter electrode with insulated pins that can be driven to a depth great enough to indicate core moisture content should be used. In addition to testing for moisture it would be wise to take some 1/2-inch sections that can be flexed enough to show whether surface checks are already present. Moisture- and check-test sections should be cut at the time the kiln samples are prepared. When stock that appears to be inadequately end trimmed and coated is received, a sufficient number of ends should be cut back to make sure that end checks have not penetrated deeply. All necessary commercial adjustments should be made before kiln drying is started.

### Drying Ramin

#### Partly Air-Dried Stock

With partly air-dried stock that is already in channels at too high a moisture content, two alternatives are available. One is to continue air drying on stickers in a fairly well-enclosed shed; the other is to use a special modification of the kiln schedule for air-dried stock.

If 2-inch stock is very high in moisture content, its air drying should be completed in a shed where it would not be disturbed for some time, and the loss in moisture followed by periodic weighing of the kiln samples. In carrying out the second alternative, follow the same general procedures indicated in table 1 for kiln drying air-dried stock; however, use a smaller depression during the initial drying stage as required, but no smaller than 5° F. Such partly air-dried stock with high moisture content in check-susceptible species such as ramin and oak constitutes a most difficult seasoning job.

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<sup>3</sup>American Society for Testing and Material, Methods of test for moisture content of wood, ASTM Standard D2016-65, 1965, Philadelphia, Pa.

## Kiln Drying Air-Dried Stock

The kiln drying of previously air-dried ramin should, in general, follow the procedures recommended on page 124 of the Dry Kiln Operator's Manual.<sup>4</sup> Kiln schedule information has been received from a number of firms that have handled a relatively large quantity of ramin. Six-quarter and thinner ramin that has been thoroughly air dried using the best practices apparently can be kiln dried using relatively severe conditions. However, some air-dried ramin of higher moisture content will not stand such severe drying, primarily because the normal air-drying conditions produce little tension set in the outer zones. Therefore, the schedules given in table 1 are suggested. As a kiln operator gains experience, he may be able to modify these somewhat for faster drying. In following these schedules, use the minimum times in the first column before considering changing conditions on the basis of the moisture content. The shorter times should be satisfactory for 4/4 and 5/4 stock and the longer times for the 6/4 and 8/4 stock.

Table I .--Schedules for kiln drying previously air-dried ramin

Time on first 2 schedule steps	Moisture content at start of step	For 4/4 and 5/4 stock			For 6/4 and 8/4 stock		
		Dry bulb tempera- ture	Wet-bulb depres- sion	Wet- bulb tempera- ture	Dry-bulb tempera- ture	Wet-bulb depres- sion	Wet bulb tempera- ture
	Percent	°F.	°F.	°F.	°F.	°F.	°F.
First 16 to 24 hrs.	Above 25	130	10	120	130	8	122
Minimum 16 to 24 hrs.	25	140	14	126	140	10	130
	20	150	30	120	150	25	125
	15	160	50	110	160	50	110
	11 <sup>1</sup>	180	50	130	180	50	130

<sup>1</sup>Moisture content of the driest sample should be reduced to 4 to 6 percent on this step of the schedule before starting equalizing or conditioning.

General operational procedures given in Chapter 10 of the Dry Kiln Operator's Manual<sup>4</sup> should be followed. Specifically, the kiln should be brought up to temperature with the vents closed and the steam spray turned off. If the wet-

<sup>4</sup>Rasmussen, E. F. Dry Kiln Operator's Manual, Agr. Handbook No. 188, 197 pp., 1961. Available from Superintendent of Documents, U.S. Gov. Printing Office, Washington, D.C.

bulb temperature does not naturally rise fast enough to keep the wet-bulb depression less than 15° F, during warmup, open the spray valve just long enough to bring the depression up to that called for by the first step of the schedule. Avoid condensing water on the surface of the lumber. If surface checks are already present in the lumber, they will probably open up during this warmup period or the first few hours on the first conditions. Such checks should close again at the final stages of drying if these procedures are followed.

### Kiln Drying Green Stock

The following kiln schedule suggestions for green stock have been included to cover cases where logs have been imported and the lumber is freshly sawed. The British Forest Products Research Laboratory<sup>5</sup> recommends its schedule C for 4/4 stock and its regular modification of schedule B for stock thicker than 6/4. These schedules are roughly equivalent to hardwood schedules T3-C2 and T2-C1 in the Dry Kiln Operator's Manual.<sup>4</sup> These schedules may be too conservative for American use. A number of firms have indicated that they have successfully handled ramin of a high moisture content by using schedules similar to those used for American beech. It is, therefore, suggested that schedule T5-C2 may be appropriate for 4/4 and 5/4 stock and schedule T3-C1 may be appropriate for 6/4 and 8/4 stock. We have no information as to the suitability of these schedules, however.

### Kiln Drying Quarter-Sawn Stock

Some years ago, the Australian Division of Forest Products<sup>6</sup> developed a kiln schedule for quarter-sawn 4/4 ramin that originated in Borneo (table 2). Quarter-sawn material is, of course, less subject to surface checking and splitting at low and moderate temperatures.

The report from which table 2 was taken indicates that the schedule is most satisfactory for mixed (bastard) sawn ramin. It states that if the kiln charge is made up entirely of quarter-sawn material, a more severe schedule may be used. The drying time for green stock was stated to be 2-1/2 days and for stock air dried to 27 percent moisture content about 1-1/2 days. This, of course, is for 4/4 stock, not 5/4 or 6/4.

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<sup>5</sup>Great Britain Forest Products Research Laboratory, Kiln Drying Schedules, Leaf let No. 42, Rev. Jan. 1959. (British Information Office, 845 Third Ave., New York, N.Y. 10022).

<sup>6</sup>Commonwealth Scientific and Industrial Research Organization. The Seasoning of 1-inch Quartersawn Ramin (*Gonystylus* sp.), First Report. CSIRO, Div. Forest Products, 1950. South Melbourne, Australia.

Table 2. --Schedule for quarter-sawn 4/4 ramin

Moisture content at start of step	Dry-bulb tempera- ture	Wet-bulb depres- sion	Wet-bulb tempera- ture
<u>Percent</u>	<u>°F.</u>	<u>°F.</u>	<u>°F.</u>
Above 30	140	10	130
30	140	20	120
20	160	30	130
Conditioning	180	10	170

### Equalizing and Conditioning

Regular procedures for equalizing and conditioning<sup>4</sup> should be followed. If the stock has been well air dried to a uniform moisture content, equalizing perhaps can be omitted. It would be important to equalize, however, if two different thicknesses are included in the same kiln. Best utilization of this wood has been obtained when the range in moisture content has been held to a minimum. The samples for the start of equalizing should be taken from the thinner stock. During conditioning of this species, it would be wise to avoid any short-time procedure at or near saturation (i.e. "steaming").

### In Summary

The use of the above suggestions should be helpful in the handling of ramin and should, with minor exceptions, eliminate most of the difficulties. If this does not turn out to be the case, please send samples, with details of all the circumstances, to the Forest Products Laboratory.

