Some Thoughts On Sawing Tropical Trees

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In *A-Z* p. 346 we mentioned the donations program of the Wood-Mizer Sawmill Company that has made it possible for many Christian groups in the tropics to obtain a portable sawmill at half price. Glen Munro is the man who has trained many of the recipients in sawing tropical woods. The following is an interview I had with Glen as we returned from a trip to Costa Rica.

(MP) *What are some of the ways in which wood from one kind of tropical tree might differ from another?*

(GM). I can think of several. Different species can differ dramatically in resistance to termite damage. Some species will give straight boards during sawing, whereas others may curl as they are being cut. Lumber differs in how you can work it. For example, some species become so dry and hard that you cannot drive a nail through the board. That's still OK if you plan to use bolts.

(MP) *What is an example of a wood that doesn't stay straight?*

(GM) Many species of eucalyptus can be a problem. It can be especially difficult if you are sawing a green (not dried) eucalyptus log that is less than 16 inches (41 cm) in diameter.

(MP) *What happens?*

(GM) While you are sawing the board curls and sometimes also twists. Sometimes it looks like ski runners. This happens because there is tension in the wood cells. More wood is cut in the second cut (because it is nearer the center of the log) than was cut in the first cut. So there is more tension released on one side than on the other. The result is that the difference in tension curls the wood.

(MP) *So is eucalyptus useless for sawn wood?*

(GM) Not at all. You can get around this problem if you girdle the tree. This kills the tree. Let it stand for at least 18 months to dry, then cut it down. Now when you cut boards they will be as straight as any. If wood is scarce, you might let local people climb up and cut limbs for use in cooking if they wish. Wood from most species of eucalyptus is very termite resistant (local people can usually tell you which species are resistant).

(MP) *Many farmers like to plant fruit-producing trees as an investment for an emergency "savings account" to be cut in a crisis, with fruit being the interest until the investment is needed. What are some fruit trees that might be especially good for*

lumber and how are they used?

(GM) Coconut "wood" is used where strength is not needed, especially as siding of buildings to shed water. You must let the dead tree dry a year before cutting. The fibrous, very wet, wood of recently cut palm trees is difficult to saw and to cut straight. That is true of any soft wet wood, e.g. balsa. In Samoa a missionary had trouble sawing coconut trees that grew near the beach, because wind had blown so much sand into it. He solved it by washing the logs first. Mango grows into a large tree and makes excellent wood. Mango logs are also used to make canoes. Tamarind trees make very large logs.

(MP) *You mentioned to me that you have sent missionaries a* _discussion on making wood shingles. Tell us more about that._

(GM) Many missionaries have found wood shingles to make the mission buildings much cooler than those made with metal roofs. If you chose local weather-resistant woods, the roofs should last just about as long as metal roofs, which are notoriously hot.

(MP) *Have you encountered any other unique problems?*

(GM) Some wood has so much silica (the same chemical that is in glass and sand) that your blade can become dull after cutting only one board. Many missionaries find at least one species where they actually see sparks when sawing. This is especially true in rainforest areas where there is a lot of species diversity. Ebony, which is exceptionally dense wood, is one tree that contains silica. The amount differs from species to species. After sawing half a dozen eight-foot long boards you may need to sharpen the blade. Ebony is mainly used to make musical instruments.

Interestingly, the persimmon, a popular fruit tree in the temperate and subtropical climates, is a relative of ebony. Its wood is used to make the heads for golf clubs.

(MP) *How can you tell that a tree has silica in its wood?*

(GM) You can't tell by looking at it. Local people will know because they will have discovered that they cannot pit-saw it (a method of sawing boards by hand from logs).

(MP) *How is lumber dried in the hot, humid tropics?*

(GM) About the only technique people with minimal resources will have is to stack it. As in the USA, boards are laid across some sticks, another series of sticks is placed on top of the board, another layer of boards is added etc. We call this a "stacked and stickered pile." When stacking lumber to dry where the humidity is quite high, it is important to have a much narrower pile than we might make in the States. In the humid topics it should be no greater than three feet. Put something on top to shed water, with some stickers between the top boards and the covering. In the US we use sheet metal to keep rain off of the pile, but even banana leaves would help.

(MP) *What makes good furniture wood?*

(GM) The boards must remain straight when they dry. It is also important that they not change shape much as the humidity of the house changes. As a board absorbs moisture, its length changes very little. What does change is that it tends to form

arches (change tangentially). For example, on a basketball court you may see boards cup or ark. A good floor will have the same tangential orientation or it will not be able to be sanded because of the mounds and valleys.

(MP) *Wait a minute. What is "tangential orientation?"*

(GM) If you look at the end of a board, the tree rings will make curved arcs, facing either up or down. This is especially important in flooring. The boards must either have all the arcs facing up or, preferably, all facing down. The important thing is that wood is laid tight end to end but not side to side. This can be quite pronounced in a large floor, like a gymnasium, where the floor can expand 2 inches in the perpendicular to the boards (i.e. a large floor could become 2 in/5 cm wider in humid weather).

(MP) *Wood can be dried much faster in a kiln. Are there any disadvantages to using kilns?*

(GM) It is important that you not remove more than 3% of the moisture from any lumber in any one day. For example, if a board has 20% moisture there would be 20 grams of water per 100 grams of board. You would want to remove about 0.6 grams (3% x 20 grams) of the water a day. The way you measure this is to daily weigh a small piece (test block) of the wood that is kept in the kiln along with the lumber. If you dry faster than this you will cause the surface to check. A check is like a crack, except it is seldom more than 1/8 of an inch (0.3 cm) deep. The moisture in the center can't get out quickly so the inside can't shrink but the outside wants to shrink because the moisture has left. The result is that exterior fibers pull apart from one another. Do not put wood in the sun to dry or it will cup (the bottom of board doesn't dry as fast). For that reason, solar kilns do not have the wood exposed directly to the sun.

In vacuum kilns we get what is called "honeycombing" if the board is more than four inches (10 cm) thick, unless it is dried much more slowly than the rate used for thinner boards. This is caused by water "boiling" because of the low pressure. If it can't get out fast enough it pops, sometimes leaving large gaps inside. In vacuum kilns water changes to vapor inside wood cells and even comes out from the center of the board. We had some hardwood blocks 6 inches (15 cm) square sent to Haiti for use in making carvings. The wood had been dried quickly in a vacuum kiln. We found that inside the blocks there were ¼ to ½ inch (0.63-1.26 cm) empty spaces (honeycombs).

(MP) *Does the Wood-Mizer donations program cover kilns?*

(GM) Yes, but only solar kilns. What we would send is a kit of the moving parts. The rest would be assembled from local materials.