

TITLE: WOOD HARVESTED AT WANING MOON PHASE IN WINTER HAVE A POTENTIAL TO SAVE THE EARTH

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Summary

Recently, Erwin Thoma in Austria proposed the best harvested woods felled at waning moon phase in winter and aged with branches, showing such woods with little damage by crack, bent or attack of insect or mold. However, this proposal has not been supported by scientific results, yet.

Our studies revealed the highest quality of wood is obtained by harvesting after this proposal of all four combinations of felling period of waning or waxing moon phase and aging with or without branches. We found neither crack nor mold in the bowls made from Japanese cedar (*Cryptomeria japonica*) even after two years keeping at room temperature and no termite in the woods of Japanese black pine (*Pinus Thunbergii*) kept four months on the open air, respectively. The iodine reaction with thin slice of Japanese dogwood (*Cornus controversa*) revealed that almost all of starch found in the cells of splint area without aging, disappeared in the wood of waning moon phase aged with branches, while a relatively lot of starch remained in the wood of waxing moon phase even aged with branches. These results suggest that woods properly harvested consume or discharge starch quickly and supply few nutrients for insects or molds. Such woods may retain potential to suppress the use of chemicals as insecticides or preservers and consumption of energy, keeping as well our healthy lives as the suppression of carbon dioxide emission.

1. Experiment

1.1 Experiment with Japanese cedar

1.1.1 Felling of Japanese cedar

Two cedar trees of diameter 24-26cm with the age of 40 years were felled at waxing moon phase, on the 28th November and at waning moon phase on the 9th December 2001, in the area of Aza Komochinosu-1, Hachimori-cho, Yamamoto-gun, Akita, Japan, (N 40° 22', E 140° 03', H 314m), respectively. Each of woods was laid, with the tree crown downward on the surface of the declined side, one with and the other without branches during one year aging before lumbered.

1.1.2 Measurement of moisture content

Small slices of 1cm thick and 3cm wide were cut out of a disk of 3cm thick, which was prepared from wood harvested at waning as well as waxing moon phase, and with as well as without branches but without aging. Each slice was separated in parts of heart-, splint-wood, cambium and bark. These slices were dried in drying oven at 105 degree Celsius for 48hrs. The moisture content (MC) in % was estimated according to the following equation.

$$MC (\%) = (W - W_0 / W_0) \times 100 \quad (1)$$

Whereas, W means the initial weight, and W_0 means the dried weight.

1.1.3 Producing of bowls by hollowing out

Nine or eight bowls of outer diameter 16cm and of height 10.8 cm were hollowed out from each wood which was harvested in four different combinations as mentioned above, on the 26th December 2002. These bowls were kept at room temperature at the window side and observed the change of appearance by crack or attack of insect or mold for two years.

1.2 Experiment of Japanese black pine

1.2.1 Felling of Japanese black pine

Eight Japanese black pine trees with the age of 12 years were felled every month for seven months between October 2003 and April 2004. Four of eight trees were felled at waning and the other at waxing moon phase of the month and two of four at a moon phase were aged with and the other two without branches for three months laid above, not direct on the surface of the felling place of 539 Sakaimatsu, Tsukuba.

1.2.2 Observation of attack of termite

At the end of aging of the last felled trees, all of 56 trees were cut into the length of 30cm and each one specimen of cut woods were let stand straight on the land in front of the house in the open air at random for additional three months. During this period and thereafter we observed the change of appearance of the woods regularly. On the first day of the observing, no termite was found on any wood.

1.3 Experiment with Japanese dogwood

1.3.1 Felling of Japanese dogwood

Two Japanese dogwood trees were felled either at the waxing moon phase on the 5th January 2004 or at the waning moon phase on the 18th January 2004. The age of these trees were about 13 and 18 years, respectively and the tree crown slightly upward on the surface of the declined side at the place 4284-5 Bird Golf Kuno, Odawara (N 35°15' 30", E 139° 07' 24-29", H 144-151m) with branches until May of the year.

1.3.2 Starch content by means of iodine reaction

Radial sections of 30 micron meter thick were cut from the splint wood, and treated by iodine reaction for detecting the localization of starch. The sections were observed under a light microscope.

2. Results

2.1 Experiment of Japanese cedar tree

2.1.1 Moisture content

The moisture content was calculated as mean value of two specimens with and without branches but without aging at waning or waxing moon phase (Table 1).

Table 1 The moisture content total as well as in part of wood disk (n=2)

part name	moisture content (%) waning moon phase	moisture content (%) waxing moon phase
total	175.9	164.6
bark	187.5	193.9
cambium	265.7	271.4
splint wood	176.6	178.6
heart wood	164.8	153.0

2.1.2 Bowls made from Japanese cedar

The bowls made for this experiment were shown on the *Figure 1* and the results were showed on the Table 2. No attack of insect was observed in all bowl samples. Cracks were found at the first observation period of May 2003, while the attack of mold was recognized at the second observation period of September 2004.



Figure 1 Intact bowl made from wood felled at waning moon phase aged with branches (forward, left) and cracked bowl made from wood felled at waxing moon phase aged without branches (forward, right)

Table 2 Cracking as well as molding of bowls made from Japanese cedar harvested in four different conditions, at the different two moon phases and two aging conditions

falling moon phase	with(+) or without(-) branch	number of total bowl	number of cracked bowl	number of molded bowl	number of intact bowl	ratio of damage in %	
						cracked	molded
waning	+	9	0	0	9	0	0
waning	-	8	4	0	4	50.0	0
waxing	+	8	0	3	5	0	37.5
waxing	-	9	5	1	4	55.0	11.1*

observation in September 2004

* : one bowl has crack as well as mold

2.2 Attack of termite at Japanese black pine

The attack of termite was shown in the *Figure 2a – c*. Termites (*Figure 2a*) were found flocking to certain woods of ten to twenty. One month after termite nest was found at the bottom of the wood. These nests looked covered with wax-like substance (*Figure 2b*). It might be guessed more than several thousands termites were in the nest. After washing out of nest, the cut surface attacked by termites has many bores (*Figure 2c right*). The ratio of woods nested by termites was estimated (Table 3).

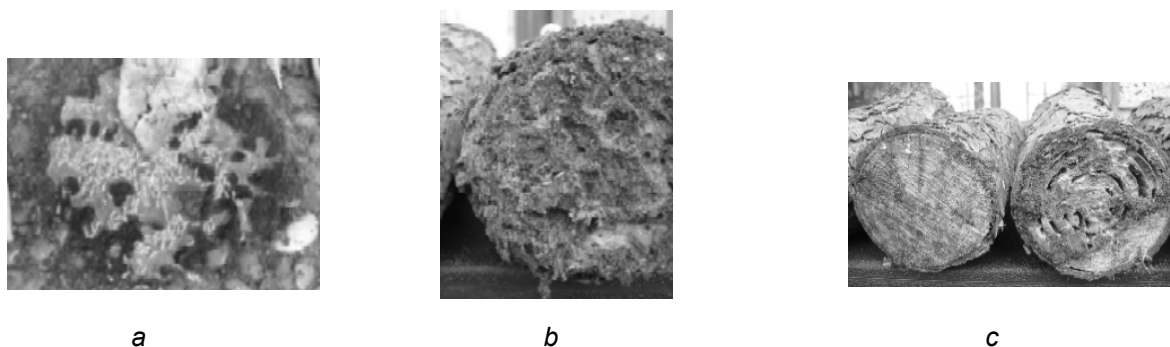


Figure 2 Attack by termites

- a: Termites on the bottom of the cutting surface of Japanese black pine tree
b: The termite nest covered with wax-like substances on the bottom of the cutting surface.
c: After washed out many bores which termites ate out are seen at the bottom of the wood felled at the waxing moon phase and aged without branches (c right) and no trace of bore on the bottom of the wood felled at the waning moon phase and aged with branches (c left).

Table 3 Observation of termite nest, which were closed with wax-like substances at the bottom of the wood.

felling moon phase	aged with(+) or without(-) branches	number of nested wood in 14 wood specimens and ratio in % in (parenthesis)
waning	+	0 (0)
waning	-	1 (7.1)
waxing	+	4 (28.6)
waxing	-	6 (42.9)

2.3 Starch content in Japanese dogwood

2.3.1 Appearance of cut surface of the Japanese dogwood felled at the different moon phase

The picture of the cut surface of the Japanese dogwood was shown on the Figure 3.



Figure 3 The cut surface of Japanese dogwood felled at waning moon phase (right) and at waxing moon phase(left) aged with branches

2.3.2 Starch content after Iodine reaction

After Iodine reaction of sliced wood specimen, starch compounds in the wood cells can be seen as black particles. The results were shown in the *Figure 4a – c* below. Just after felling the wood cells contain starch like as *Figure 4a*. In the cells of wood which was felled at waning moon phase after aging with branches contained no starch as shown in the *Figure 4b* and in the cells of wood felled at waxing moon phase some starch particles were found , yet, even the wood was aged with branches as shown in the *Figure 4c*.

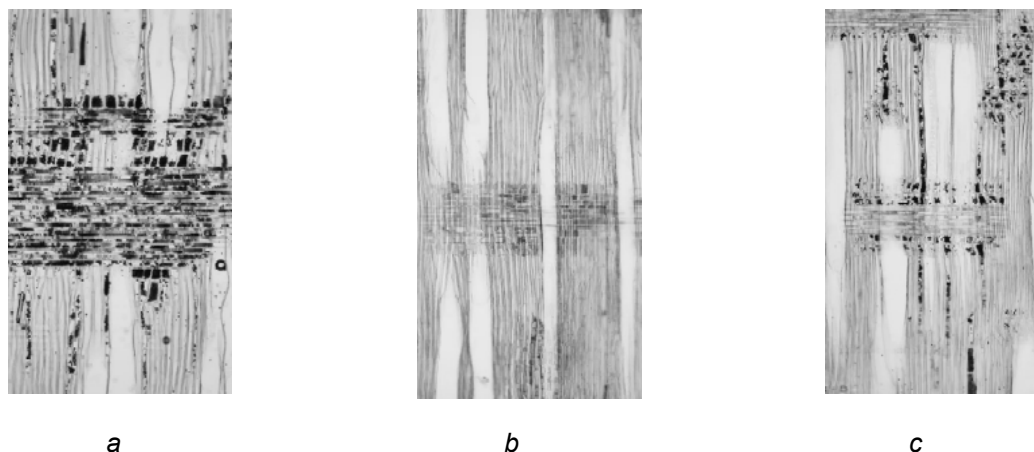


Figure 4 *Microscopic photographs of the slice of the splint area of Japanese dogwood after iodine reaction*
a: Just after felled down. There can be confirmed black particles in the cells as starch.
b: Felled at waning moon phase and aged with branches . There can be confirmed no starch in the cells.
c: Felled at waxing moon phase aged with branches. There can be confirmed black particles in the cells as starch.

3. Discussion

Japanese cedar as conifer and Japanese dogwood as broadleaf wood were felled at waning as well as waxing moon phase. In both cases crack and mold were obviously observed in the woods which were felled at waxing moon phase as shown as in the *Figures 1* and *3*. Especially in the case of Japanese cedar, the bowls made from the wood felled at waning moon phase as well as aged with branches had neither crack nor attack of mold for two years and the bowls made from the wood felled at waxing moon phase as well as aged without branches had crack of the ratio of 55% and mold attack of 11%. Bowls even made from the wood felled at waning moon phase, when the wood aged without branches had crack of the ratio 50% but no attack of mold were observed. In the contrary, bowls made from wood aged with branches but felled at waxing moon phase were attacked by mold of ca. 38% without any crack. All wood materials were felled at the same area in winter season with difference of ten days and with the age of 40 years. After lumbering cut woods were treated under same condition. All bowls were hollowed out by machine so as the area of heartwood were settled in the center of bowl.

Japanese black pine woods for the termite experiment were grouped into four combinations of felling moon phases and aging with or without branches. Each group is composed of 14 woods which were felled in seven months from October to next April. Two trees in each group were felled in a month. The setting place of all 54 woods was selected at random using a table of random numbers. In this experiment it was also evaluated that no attack of termite was found in all 14 woods felled at waning moon phase and aged with branches, while ca.43% of 14 woods were attacked by termites, which were felled at waxing moon phase and aged without branches. Woods even felled at waning moon phase, but aged without branches as well as woods even aged with branches, but felled at waxing moon phase were attacked by termite at the ratio of ca. 7% and ca. 43%, respectively.

The effect of felling at waning moon phase and aging with branches against crack or attack of insect or mold was obviously revealed in these experiments of two conifer trees, Japanese cedar and Japanese black pine, independently.

As for the Japanese dogwood, both cases were aged with branches, but wood felled at waning moon phase was not attacked by mold and the crack was smaller than at the wood of waxing moon phase, whose cut surface was covered with molds of different color. In our preliminary experiment of Japanese dogwood we already found the similar effect with the plates, even though these two plates were kept under severe condition like as in the summer with high humidity and in the winter under heating by air conditioner. Some cracks were even found in the plate of waning moon phase but these cracks did not grow during keeping, but cracks in the plate of waxing moon phase became larger. The mold did not transferred to the plate of waning moon phase even though the cut surfaces of both plates of waning and waxing moon phases were put together for several months.

The iodine reaction at Japanese dogwood was confirmed that almost of starch compounds in the cells of splint wood harvested at waning moon phase diminished and this phenomenon suggests that starch was consumed for production of phenol substances or other compounds, and/or discharged from wood and contained little nutrient for insects or molds, while, woods harvested at waxing moon phase contain still starch which may be used as nutrient.

Total moisture content of Japanese cedar of both moon phases without aging treatment was measured in approximately narrow range of 176% at waning to 169% at waxing moon phase, respectively, and we could not find obvious difference of moisture content in the wood, which is generally considered to be a cause of crack or attack by insect or mold. When we measure the moisture content in wood by means of drying method or electro-conductivity using a moisture meter, we can only measure total moisture or that of a certain part of wood. E. Zuercher mentioned of free water and bound water in the wood. In his experiment he measured the content of bound water as higher in the splint- as well as heart-wood felled at waning moon phase than at waxing moon phase, while the initial density in the splint wood part and the ratio of diminished weight after complete drying in oven was higher in the wood in both parts felled at waxing moon phase than at waning moon phase. The loss of weight after dry may be caused mainly by loss of free water, and it may be concluded that the wood felled at waxing moon phase contains more free water than the wood felled at waning moon phase. It is to be found out the relation of behavior of moisture in the wood and crack and bent.

In the area of middle Europe ancient people traditionally felled trees at waning moon phases in winter season believing this harvesting period as the best and built houses with those woods, and some houses stand still several hundreds years. In Japan the Horyuji Temple is known as the oldest wooden building in the world and the center pole of the five-stored pagoda was found as harvested in the year of 594 AD. Those woods at that period were not chemically treated but this tradition had almost been forgotten by inducing industrial technology which causes consumption of enormous energy. Woods are now treated with many toxic chemicals or carcinogenic substances to protect from decay, attacks of termite or insect, and shrinking during use. These chemicals may be scattered everywhere all over the earth soon after these treated woods happen to be discarded. Our results suggest that the woods harvested at waning moon phase in winter season and aged with branches for longer than three months protect by themselves from crack and attack of insect, termite and mold, that means they need neither artificial drying which consumes energy nor toxic chemicals as insecticide, preservers and adhesives which cause as sick-house and -school well as pollution. Moreover regular usage of woods and proper maintenance of forest may diminish the emission of carbon dioxides.

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