Wood Drying Method by "Teresan" Process on Sengon Wood (*Paraserianthes falcataria* L. Nielsen)

Yoyo Suhaya, Bambang Subiyanto and Yoshinori Kobayashi

Abstract

This research aims to confirm the effect of conventional teresan process as a natural drying on Sengon (*Paraserianthes falcataria* L. Nielson) standing trees, and to develop a new teresan process by adding Arboricide.

The experiment was done in dry season at Kuningan, West Java. For the conventional teresan process, living trees were nicked into the cambial layer around the trunk at 15 ~ 25 cm in height from the ground. For the new teresan process, 25% percent kerosene solution of Arboricide Garlon 480EC was coated at the nick of the tree.

Living Sengon trees in dry season showed high moisture content, i.e. around 60 ~ 100%. By the conventional teresan process, the reduction of moisture was almost the same as control trees. On the other hand, by the new teresan process coating with 25% kerosene solution of Arboricide Garlon 480EC it showed a large reduction of moisture content from over 100% to 30% in 4 months. The new teresan process showed the drying speed of 0.66% per day; higher than that of the conventional process, i.e. 0.24% per day. The new teresan process could be suggested as a high-speed natural drying method in the forest.

Key words: wood drying, teresan process, Arboricide, moisture content.

Introduction

Wood drying is one of the important processes in wood processing. Conventional wood drying such as kiln drying consumes much energy from fossil fuel. Besides heating of wood and air, the conventional kiln drying needs a lot of energy to decrease the relative humidity when exhausting of hot air in the kiln.

Conventional kiln drying is an important drying method for Indonesian wood industries, but it needs some expensive equipments and costly. Therefore, the new natural drying methods are needed to save energy and to decrease the drying cost.

A traditional natural drying method, called "Teresan Process" is an easy and low cost pre-drying treatment and can be naturally applied at standing trees in the forest, because the process do not consume fossil fuel energy. In the teresan treatment, the standing trees are cut to prevent sap flow from the root to reach cambial layer. Therefore, the standing trees will be slowly dried only by the natural climate in forest. In the case of Teak wood (*Tectona grandis* L.f.), it takes two years before felling down (Perhutani 1999). The other purposes of this treatment are to make easy in felling, transportation and handling of trees. Considering from these subjects, it is important to shorten the drying time of the teresan treatment.

The teresan process is economical and ecological drying method. It is interested, how the teresan can be applied to wood species other than Teak wood, for example Sengon wood. Therefore, we tried to develop a new teresan process as a natural drying method in forest by using the combination of teresan and chemical agent like Arboricide Garlon 480 EC as coating treatment. Arboricide Garlon 480 EC is active poison that can affect damage or poison for leaf. It is frequently used as herbicide. Arboricide Garlon 480 EC containing active reagent Triklopir 480 g/l. Arboricide is solid then can be melting into emulsion violet. The function of Arboricide is to accelerate tree died, so that it can accelerate the drying process, as well.

Materials and Methods

Materials and Tools

Materials used in this research were three Sengon trees (*Paraserianthes falcataria* L. Nielson) at 6 years old, 25 cm in diameter, and located at Kuningan West Java. The trees were used for (1) control, (2) conventional teresan process and (3) newly developed teresan process, respectively. The nick in the trunk was given by an ax to reach the cambial layer.

Method

Teresan Process and Drying of Tree: In the conventional teresan process, the standing tree was debarked and nicked to the cambial layer in V shave with 5 cm in width at 15 ~ 25 cm of height from the ground. In case of new teresan process, the standing tree was debarked to the cambial layer as the same manner as the conventional teresan process and coated by 25% kerosene solution of Arboricide Garlon 480 EC about 50cc at the debarked part using a brush. The three specimens, i.e. control, conventional teresan process and new teresan process, were left for 6

months in the forest. Then trees were felling and sawing to measure moisture content.

Measurement of Moisture Content of Standing Tree: Moisture content of standing trees were measured on the small stick core once two weeks. To get the small stick core, the standing trees were bored 10 mm in diameter to the piths by the increment borer at 1 ~ 1.5 m in height. As soon as after getting the small sticks cores from the standing trees, they were dried for 2 ~ 3 days in oven at 103 $\pm$ 2°C to determine the moisture content of the standing trees at each week.

Determination of Drying Speed: The drying speed during the natural drying in the forest was measured by:

$$L\ (\%/day) = (M_1 - M_0) / W$$

where, L = Drying speed (%/day)
M_1 = Initial moisture content (%)
M_0 = Moisture content at each time (%)
W = Natural drying time (day)

Results and Discussions

Color Change of Leaf and Trunk

The tree of conventional teresan was died and all of the leaves were fell down in about 4 months. With a running of time, the photosynthesis product, like nutrient, that used to transport by phloem tissue could not reach the root, because the vascular cambium of the tree was cut. A part of the root did not accept the photosynthetic from leaves, therefore, cell growth and development were disturbed and finally all of the tree died.

Figure 1. The new teresan process by Arboricide, after 6 months.

Figure 2. The condition of tree by teresan process.

Figure 3. The condition of tree by new teresan process.

Furthermore, the root enabled to absorb water and nutrients from soil solution. However, the photosynthesis process by conventional teresan was slowly disturbed before the entire tree was totally died.

New teresan process by Arboricide Garlon 480 EC was different in dying process of the tree. Arboricide Garlon 480 EC solution that coated at the outer part of the barked tree into cambial layer was transported to the top of the tree through absorption process and reached the leaves. The Sengon leaves died faster and fallen by poisoning effect of Arboricide in 1 month.

Figure 4. The condition of control tree; still fresh.

Change of Moisture Content

Decreasing rate of moisture content during teresan process prior to fell of the tree after 6 months is shown in Figure 5.

Drying rate of conventional teresan process was (105.22 - 68 %) / 154 days = 0.24% per day. On the other hand, drying rate of new teresan process was (125.62 - 22.5%) / 154 day = 0.66% per day.

Figure 5 shows that both teresan processes gave different responses during research period. Teresan process with Arboricide Garlon 480 EC on the Sengon wood caused the tree died in about 1 month. It took 4 months for conventional process caused the tree died. Therefore, Arboricide Garlon 480 EC was effectively killed the Sengon tree.

Faster drying in teresan process by Arboricide affected the decreasing of moisture in wood, as a result of the greatly water loosed in tissue for adaptation with surrounding. After 6 months observation, it shown that moisture content reached the average of 22.5%. This condition has already closed to equilibrium moisture content (EMC). Moisture content of conventional teresan process after 6 months observation was 68%; these moisture content was higher than that of teresan by Arboricide treatment. On the other hand, the moisture content of control tree was 105.5 %.

Arboricide gave a little effect on the colour; the wood became darker than usual. However, the mechanical properties were not changed.

The low moisture content of the standing tree gave some advantages, such as:

1. Cutting or felling process could be easier, because the leaves of tree were fallen and wood became lighter.
2. The wood lighter caused skidding process could be easier and faster.
3. Transportation cost would be cheaper.
4. Sawing process was more simply because, the wood was dry and lighter.
5. Temporarily visual observation to the lumber from sawing process showed that the lumber of teresan process by Arboricide was straighter compared to the control. It caused by tree was died for a long time, so growth stress in the tree decreased. However it is needed further research to get more accurate data.
6. The other advantage was branches that could not be used as lumber, could be directly used as firewood.
7. Drying cost for further drying by kiln could be cheaper because of lower moisture content.

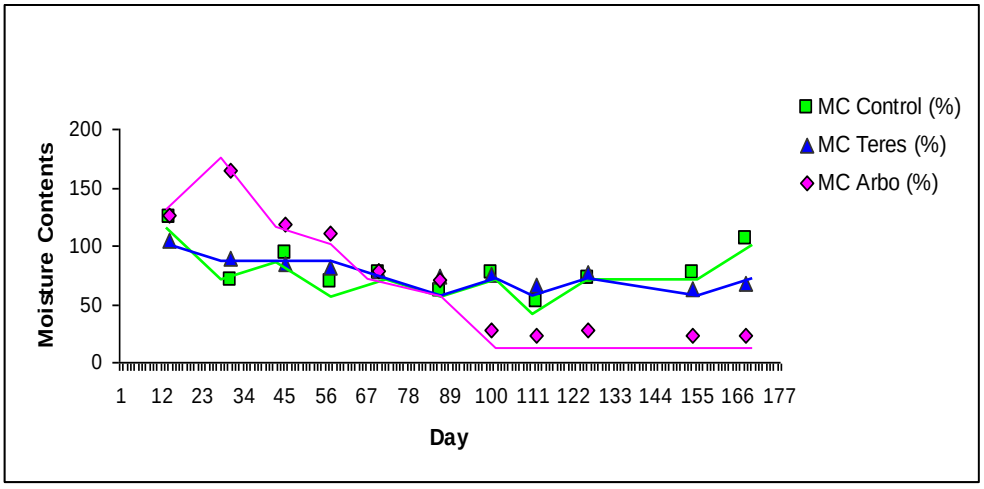

Figure 5. Decreasing moisture content during teresan processes.

In general, both conventional and Arboricide teresan processes are cheaper and easier process in wood drying. These processes do not need high skill or technology. These wood drying methods are ecological and environmental friendly compared with the other drying methods by heating. Burning process causes air pollution, whereas these methods do not cause air pollution.

Conclusions

According to the results of this research, it can be concluded that:

1. Wood drying method by teresan process with Arboricide Garlon 480 EC increased the drying rate to 0.66 % per day.
2. After 6 months observation, moisture content of teresan process that coating by Arboricide Garlon 480 EC reached 22.5%.
3. Wood drying method by teresan process with Arboricide Garlon 480 EC could be used as an alternative for wood drying (as pre-drying) before further drying process with kiln drying.

References

D. Kusnadi. 1999. Preservation of Wood Sengon (*Paraserianthes falcataria* L Nielsen) with CCB Preservative by Cold Soaking and Full Cell. Dept. of Forest Product Technology, Faculty of Forestry, Winaya Mukti University. Jatinangor Sumedang Indonesia

Haygreen; Bowyer. 1993. Forest Products and Wood Technology. UGM Press. Yogyakarta.

Kollman, H.F. 1970. Kiln Drying Western Softwood Moore, OR: Moore Dry Kiln Company of Oregon.

Martawidjaya *et al*. 1981. Indonesian Wood Atlas I. Forest Product Technology Research and Development Center, Bogor.

Martawidjaya *et al*. 1989. Indonesian Wood Atlas II. Forest Product Technology Research and Development Center, Bogor.

Perhutani. 1999. Guides for Teak Forest Felling. Jakarta.

Accepted on January 4th, 2005

Yoyo Suhaya,
Faculty of Forestry, Winaya Mukti University,
Jl. Winaya Mukti No.1 Jatinangor-Sumedang, West Java Indonesia 45363.
Tel/Fax : +62-22-7798260.
Email : yoyosuhaya@yahoo.com

Bambang Subiyanto
Research and Development Unit for Biomaterials – Indonesian Institute of Science.
Jl. Raya Bogor Km.46, Cibinong - Bogor, Indonesia 16911.
Tel : +62-21-87914511, 87914509.
Fax : +62-21-87914510.
Email : komposit@cbn.net.id

Yoshinori Kobayashi
Institute of Wood Technology, Akita Prefectural University, Noshiro, Akita 016-0876 Japan.
Tel : +81-185-52-6985.
Fax : +81-185-52-6976.
Email : koba@iwt.akita-pu.ac.jp