ABSTRACTS (MASTER THESIS)

Biological and Chemical Characteristics of the Aged Wood with a Special Reference to the Radial Location

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Introduction

It is well known that wood in service changes its mechanical and chemical properties. The major causes of these changes are biological deterioration, weathering and natural aging. Many studies have been carried out regarding the former two causes, but there are little studies about the nature of the aged wood. In addition, some beetles are known to prefer the aged wood as their host, and the volatile compounds seem to play a major role in detecting the host wood.

In this study, laboratory tests were conducted to know the biological performance of the aged wood, and its chemical characteristics were also surveyed.

Materials and Methods

Sapwood of two aged and one new timbers of *Pinus thunbergii* were used as samples. For the aged timbers, test specimens were taken from three sampling points (1^{st}: near to surface, 2^{nd}: middle part of sapwood, and 3^{rd}: near to heartwood) in the radial direction.

Termite and fungi tests were carried out according to the Japan Industrial Standard (JIS) K-1571(2010). Volatile compounds from the samples were captured by Monotrap®, and extractives were obtained with dichloromethane by the help of the ultrasonic treatment. They were served for the GC-MS analyses.

Results and Discussion

Mass losses due to biological attacks in the aged wood samples generally were higher than those in the new wood samples, and the higher values were obtained from the samples which are closer to the heartwood. These results suggest that the wood surface, being received the most severe aging effects, has the highest biological resistance against termite and fungi.

By the GC-MS analyses, longifolene (RT: 14.235 min) was detected in both the volatile and dichloromethane extract in all the samples. α-pinene (RT: 5.107 min) was present only in the new wood samples. On the contrary, longicamphenylone (RT: 14.205 min) was found only in the dichloromethane extract in the aged samples. These three chemicals have been reported as essential oil components of *P. thunbergii*. It has also been reported that longicamphenylone can be obtained by oxidization of longifolene. Therefore, it is likely that longicamphenylone which is produced during the natural aging from longifolene, plays an important role in biological resistance of the aged *P. thunbergii* wood.

From these results, it is probable that conversion of some chemical components into the higher bio-active compounds can have a role for the biological performance of the aged wood.

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