

Occurrence of Tyloses in Stemwood Tracheids of *Taxodium distichum* Rich¹

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落羽松 樹幹 假導管內的 타일로시스¹

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ABSTRACT

Sclerosed and pitted tyloses were discovered in the springwood tracheids of *Taxodium distichum* Rich stemwood which has taxodioid or cupressoid cross field pits, and these tyloses were believed to be caused by protrusion of enlarged ray parenchyma cells into tracheid lumina.

Key words : tyloses ; tracheid ; ray parenchyma cell ; taxodioid or cupressoid cross field pit ; stemwood ; *Taxodium distichum* Rich.

要 約

單膜孔을 지나는 厚膜의 타일로시스가 삼나무형 또는 편백형 分野膜孔을 나타내는 落羽松의 樹幹 春材 假導管에서 觀察되었으며 이러한 타일로시스는 放射柔細胞가 假導管內腔대로 擴大 侵入됨으로써 形成되는 것으로 여겨졌다.

INTRODUCTION

Tylosis is defined as an outgrowth from an adjacent ray or axial parenchyma cell through a pit cavity in a vessel wall, partially or completely blocking the vessel lumen, and a tylosis with an exceptionally thick, laminated, lignified wall, and ramiform pits is especially referred to as sclerotic tylosis in Multilingual Glossary of Terms used in Wood Anatomy by IAWA(1964). This above definition implies that tylosis occurs only in vessels of hardwoods.

However, this tylosis was observed in fiber

tracheids of several genera of the Magnoliaceae among hardwoods by Gottwald(1972) and even in wounded or unwounded stemwood and rootwood tracheids of *Pinus* species with pinoid and fenestriform cross field pits among softwoods by Raatz(1892), Chrysler(1908), Gerry(1914), and Peters(1974).

The purpose of this paper is to report the occurrence of tyloses in stemwood tracheids of *Taxodium distichum* Rich as a research on tyloses in softwoods.

MATERIALS AND METHODS

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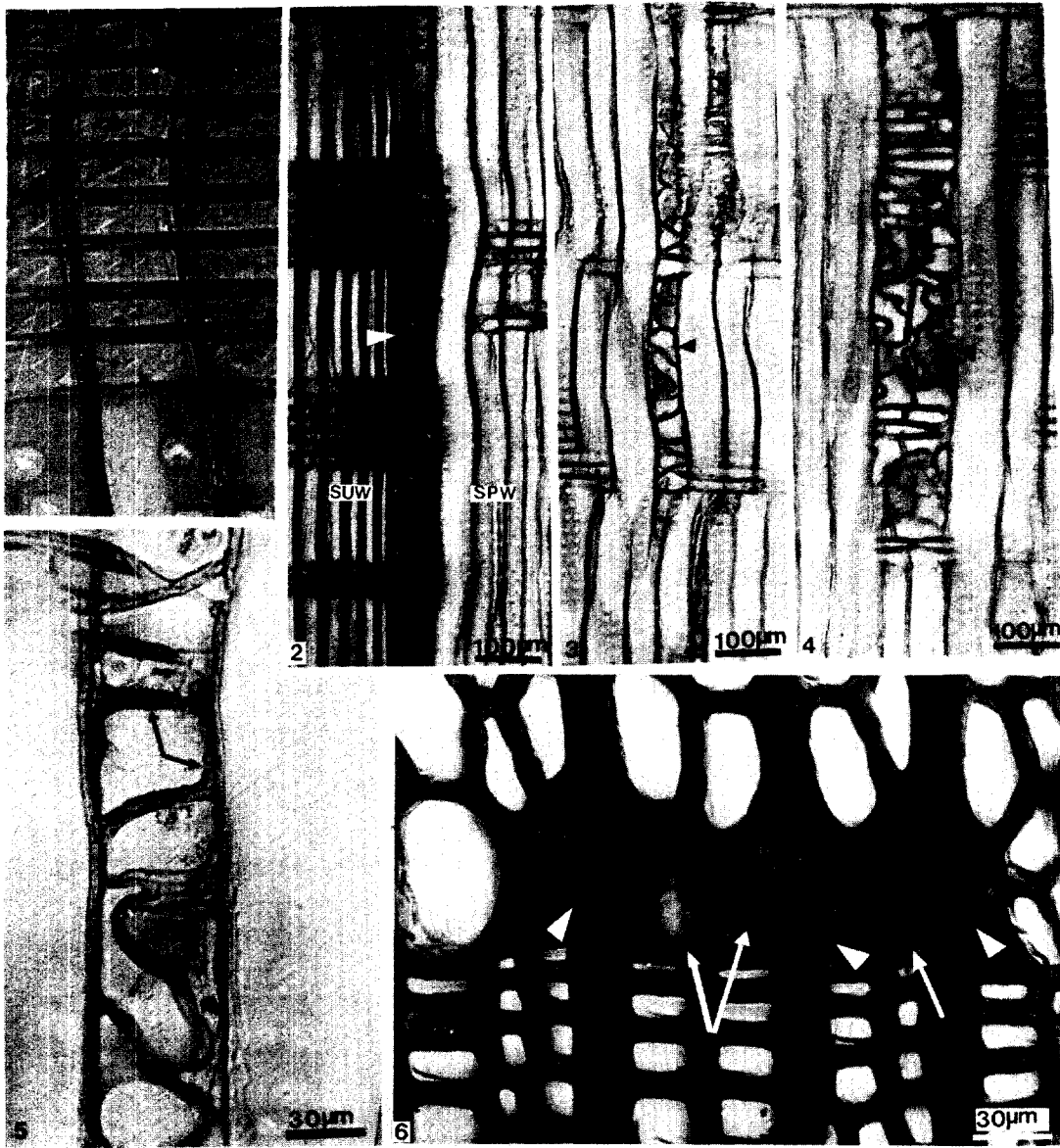


Fig. 1. Radial section of springwood showing taxodioid(▲) or cupressoid(↑) cross field pits.

Fig. 2. Radial section showing tyloses(▲) which are arranged in a longitudinal direction in the first-formed springwood tracheids. SPW and SUW mean springwood and summerwood respectively.

Fig. 3. and 4. Radial sections of springwood which show partially developed tyloses(▲) in a tracheid lumen and two contiguous tracheid lumina respectively.

Fig. 5. Radial section of tyloses having simple pits(↑) and thick walls.

Fig. 6. Transverse section which implies tyloses formation through protrusion of enlarged ray parenchyma cells(▲) into tracheid lumina(↑).

The wood specimens of *Taxodium distichum* Rich were obtained from collections of Wood Anatomy Laboratory, Department of Forest Products, College of Agriculture, Seoul National University.

Wood blocks of ca. one cubic centimeter size were cut from the specimens and soaked in water for one month before softening. Softening was conducted in autoclave with water for 90 minutes and the softened wood blocks were preserved in absolute ethanol, glycerine, and water 1:1:1(v/v) mixture until sectioning (Berlyn and Miksche, 1976). Cross, radial, and tangential sections of 20 μm thickness were made with sliding microtome and finally permanent slides were prepared after staining with safranin, dehydration with ethanol and xylene (The Japan Wood Research Society, 1985).

RESULTS AND DISCUSSION

In the stemwood of *Taxodium distichum* Rich which has cupressoid or taxodioid cross field pits (Fig. 1), tyloses were observed only in springwood tracheids sporadically. When viewed on radial surface, tracheids containing fully developed tyloses in their lumina were arranged in a longitudinal row (Fig. 2) and partially developed tyloses were observed in a tracheid (Fig. 3) and two contiguous tracheids (Fig. 4). In stemwoods of softwoods, these tyloses have been known to occur only in tracheids of *Pinus* species with fenestriform and pinoid cross field pits by Gerry (1914) and Peters (1974). Chattaway (1949) reported that tyloses seldom developed through pits as small as 8 to 10 μm in diameter, and tyloses formation resulted from the reaction of living ray cells to a stimulus which causes increased activity.

All tyloses observed in this study were sclerotic with thick, lignified walls and simple pits, and believed to cause by protrusion of enlarged ray parenchyma cells into tracheid lumina (Fig. 5 and 6). Panshin and de Zeeuw (1980) described tyloses in tracheids of *Pinus* species were all thin-walled. Peters (1974), in the research on tyloses formation of *Pinus elliottii* and *Pinus palustris* stemwood, reported that all tyloses originated from ray

parenchyma cells and their subsequent development into long, saclike vesicles was easily followed, and these tyloses were abundantly developed by a combination of mechanical wounding and chemical treatment.

CONCLUSION

Sclerotic tyloses with thick, lignified walls and simple pits were observed only in springwood tracheids of *Taxodium distichum* Rich stem. This is considered as the first report of tyloses in stemwood of softwood with cupressoid or taxodioid cross field pits.

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