Journal of Plant Resources (2025) **23**(1), 156-159
https://doi.org/10.3126/bdpr.v23i1.83360

Short Communication

Wood Anatomy of *Schima wallichii* (DC.) Korth. from Central Nepal

Pratikshya Chalise[1]*, Lajmina Joshi[2] & Yagya Raj Paneru[1]
[1]National Herbarium and Plant Laboratories, Godawari, Lalitpur, Nepal
[2]Tahachal, Kathmandu, Nepal
***Email:** pratikshya71@gmail.com

The genus *Schima* Reinw. ex Blume. is an important genus of the family Theaceae. The genus comprises of altogether than 17 species distributed in different parts of the Tropical & Subtropical Asia (Plants of the World Online [POWO], 2025). In Nepal, the genus *Schima* is represented by single species, *Schima wallichii* (DC.) Korth. (National Herbarium and Plant Laboratories [KATH], 2025; Press et al., 2000; Rajbhandari et al., 2021; Shrestha et al., 2022). The native distribution of Chilaune extends from Central Himalaya to South China and West & Central Malaysia. The species is locally known as Chilaune and form the dominant forest type in subtropical regions in Nepal, predominantly between 1000-2000 m asl. *Schima wallichii* is one of the dominant vegetation components in the subtropical evergreen forest commonly known as the *Schima-Castanopsis* Forest (Chaudhary, 1998; Dobremez, 1976; Forest Research and Training Centre [FRTC], 2021; Suzuki et al., 1991).

Schima wallichii (DC.) Korth. is a large, evergreen, multipurpose, sub-tropical tree (Pearson & Brown, 1932; Suzuki et al., 1991). The bark is gray to dark reddish brown, becoming ruggedly cracked into small, thick angular pieces. It is renowned for its wood which is considered one of the quality timbers in Nepal as well as south Asia. The wood is found to be used to be used in making door and window frames, ploughshares, railway tracts, beams, flooring, and interior, and firewood. It is often cultivated as a shade tree and is used as a pioneer species in the reforestation programs, it benefits through soil and water conservation, has medicinal values, its bark is rich is tannins and is used for dyeing (Tropical Plants Database [TPD], 2025).

Wood is hard, moderately heavy, and medium textured, without characteristic odour and taste; light red to reddish brown; sapwood and heartwood similar, gradual transition from sapwood to heartwood (Gamble, 1972; InsideWood, 2025; Pearson & Brown, 1932; Suzuki et al., 1991; TPD, 2025). But the wood is highly susceptible to insects and fungal attack (Pearson & Brown, 1932). It is easy to work with hand and machine tools and polishes satisfactorily; good-quality plywood can be manufactured from the wood, and it is suitable to produce wood-wool boards (TPD, 2025).

Vigorous increases in global trade and roadways expansion have resulted in over-exploitation of

(a) (b) (c) (d)

Figure 1: Study species: *Schima wallichii*, **(a).** collection of wood samples, **(b).** flowering twig, **(c).** flower close- up, **(d).** fruit

forest resources so the identification and traceability of wood has become very crucial in the present context. Therefore, developing accurate species level identification through its anatomical study seems to be a significant technical prerequisite for the laboratory level identification and treatments of timbers.

Wood samples were collected from Phulchowki hill, Central Nepal during September, 2023 and brought to the KATH Xylarium, boiled at 100ºC in hot air oven for softening and sectioning was done via semi-automatic microtome KDEE 3390. Temporary slides were prepared out of the resulting micro-sections, which were observed under light microscope and fine sections were selected. These sections were then dehydrated in Ethanol series, stained with Safranin and Fast green to prepare the permanent slides. The permanent slides were then studied under Olympus CX43 trinocular compound microscopes at different magnification and photomicrographs were taken by Olympus LC30 camera fitted with 1X adapter.

General properties of wood

Wood is hard, moderately heavy, close grained and without any odour. Heartwood is brown to reddish brown or, greyish brown, without any color stripes. Sap wood is similar to heartwood in terms of color and texture. Growth rings absent or, not very distinct, rarely seen as faint boundaries between earlywood and latewood. Pores evenly distributed, of nearly same size class or, sometimes slightly different in size.

Wood structure and composition

Wood is diffuse porous type. Vessels few, 5-10 vessels per mm^2, exclusively solitary, rarely in radial pairs, evenly distributed. Solitary vessel angular, slightly elliptic to oval in outline; 50-140 µm and 60-110 µm in radial and tangential diameters respectively. Vessel elements 650-1040 µm long; perforation plates scalariform, end walls oblique. Tyloses not seen. But, Pearson and Brown (1932) reported that vessel elements are 430-2990 µm long. However, Chalk (1989) considers the size as well as number of vessels is susceptible to environmental influence.

Vasicentric tracheids usually absent. Fibre-tracheids form the ground mass of the wood, square to polygonal in cross- section. Fibres non- septate, thick walled, pits circular, showing distinct bordered pits. These fibres influence both strength as well as shrinkage of wood (Anoop et al., 2019) due to which the wood of *Schima wallichii* is hard and is difficult to seasoning.

Wood parenchyma diffused, square to polygonal in cross-section, thin walled, axial parenchyma both apotracheal as well as paratracheal; apotracheal parenchyma diffused; paratracheal parenchyma sparse. Individual cells in Axial parenchyma 20-30 µm and 10-25 µm in radial and tangential diameters respectively. Prismatic crystals present in axial parenchyma cells, usually single crystal per cell. Similar features have been described in the InsideWood (2025). Suzuki et al. (1991) reported that prismatic crystals are present in a series of vertically arranged row of square cells. However, Richter & Dallwitz (2000) reported the rare occurrence of two crystals per chamber in axial parenchyma cells.

Rays not visible with the naked eyes, heterogenous; made up of parenchyma; multiseriate as well as uniseriate, multiseriate portions as wide as uniseriate portions of rays. Rays comprise of procumbent cells, upright cells and square marginal cells. Vessel-ray pits with circular or slightly oblique slit-like apertures. Starch deposits are abundant in sapwood (Pearson & Brown, 1932).

Schima wallichii is an important timber tree, that is characterized by the presence hard, durable, diffuse porous wood; exclusively solitary vessels, scalariform perforation plates; non-septate, thick-walled fibres; diffused axial parenchyma, presence of prismatic crystals in chambered axial parenchyma; rays both multiseriate and uniseriate, rays always heterogenous. However, the anatomical features sometimes can be of adaptive value so further studies on the comparative anatomical examination of same plant species existing in different ecological regions would be of great importance.

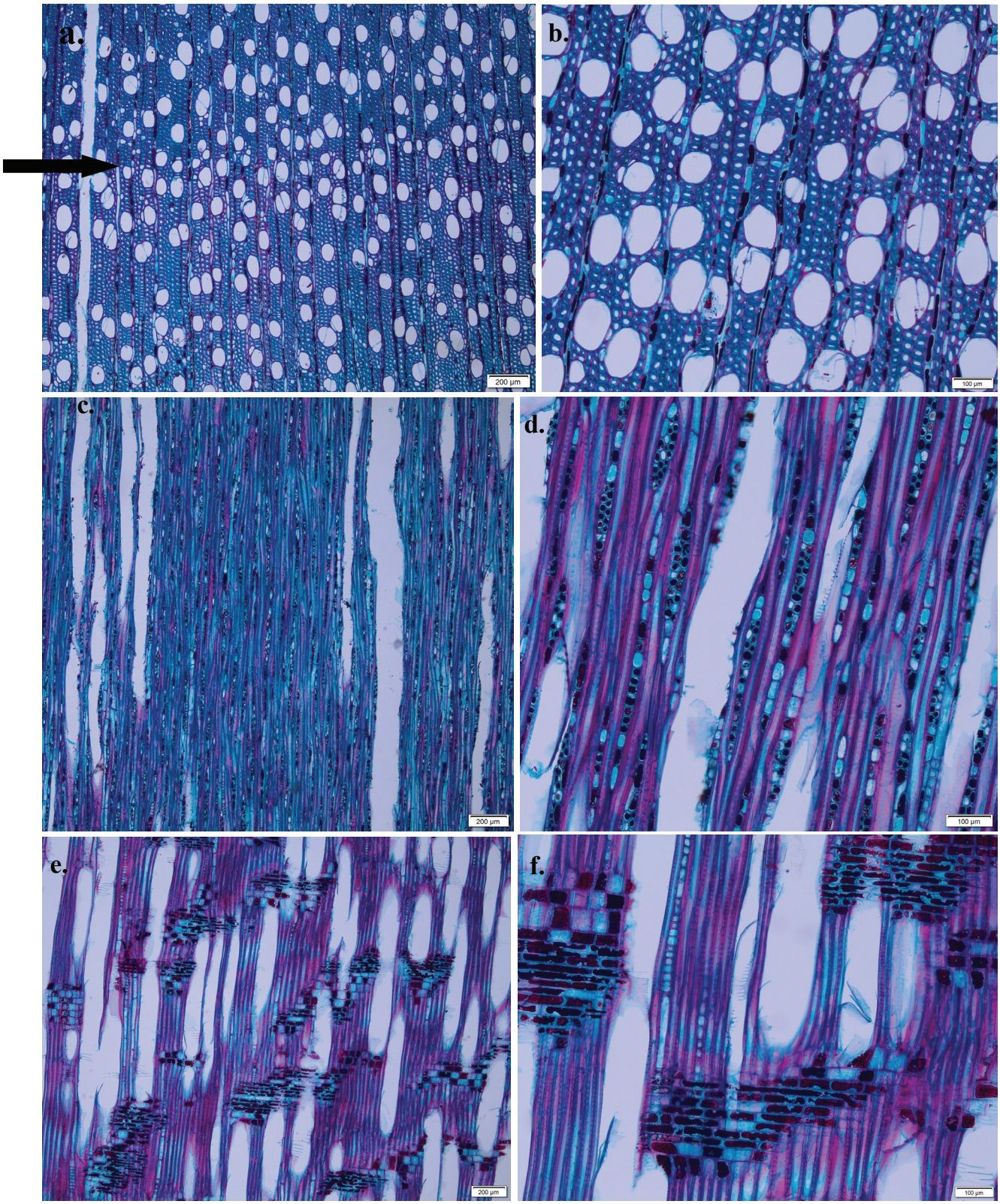

Figure 2: Wood anatomy of *Schima wallichi,* **(a), (b).** Cross-section of wood (TS) showing solitary vessels, vessels angular in cross- section, **(c), (d).** TLS of wood showing both uniseriate and multiseriate rays, **(e), (f).** RLS of wood showing heterogenous rays, Scalariform perforation plates in vessels seen in **(f).** Magnification: a,c,e (4x+1x), b,d,f (10x+1x) magnification. Arrow in figure **(a)** showing the faint growth ring boundary

The authors would like to acknowledge Ms. Jwala Shrestha, Chief, National Herbarium and Plant Laboratories, Godawari, Lalitpur for her direct as well as indirect support and motivation to shape this work in present form. The authors are also thankful to Ms. Srijana Thapa Somai, KATH for her assistance during photomicrography.

References

Anoop, E. V., Rao, R. V. & Mukundan, G. (2019). Wood anatomy and wood property variation in Red Sanders. In Pulliah, T., Balasubramanya, S., & Anuradha, M. (Eds.), *Red Sanders: Silviculture & Conservation* (pp. 131-152). Springer.

Chalk, L. (1989). Vessels. In Metcalfe, C. R., & Chalk, L. (Eds.), *Anatomy of dicotyledons. wood structure and conclusion of the general introduction* (2nd ed.) (Vol. II). Oxford Science Publications.

Chaudhary, R. P. (1998). *Biodiversity in Nepal: Status and conservation*. Craftsman Press.

Dobremez, J. F. (1976). *Le Ne´pal: E´cologie et Bioge´ographie* [Ecology and Biogeography of Nepal]. Centre Nationale de la Recherche Scientifique.

Forest Research and Training Centre. (2021). *Vegetation types of Nepal: A report based on review of literature and expert knowledge*. *EFTMP Technical Working Document, No.2*. Ecosystem and Forest Types Mapping Program (EFTMP).

Gamble, J. S. (1972). *A manual of Indian timbers*: *An account of the growth, distribution, and uses of the trees and shrubs of India and Ceylon, with descriptions of their wood-structure.* Bishen Singh Mahendra Pal Singh.

InsideWood. (2025). Theaceae *Schima wallichii*. Retrieved on various dates, from https://insidewood.lib.ncsu.edu/search

National Herbarium and Plant Laboratories. (2025). *Schima wallichii* (DC.) Korth. Retrieved on various dates, from http://www.kath.gov.np

Pearson, R. S. & Brown, H. P. (1932). *Commercial timbers of India* (Vol. I) (pp.64-66). A. J. Reprints Agency.

Plants of the World Online. (2025). *Schima* Reinw. ex Blume . Retrieved on various dates, from https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:39119-1

Press, J. R., Shrestha, K. K. & Sutton, D. A. (2000). *Annotated checklist of the flowering plants of Nepal*. The Natural History Museum.

Rajbhandari, K. R., Rai, S. K. & Chhetri, R. (2021). *A handbook of the flowering plants of Nepal* (Vol. 3). National Herbarium and Plant Laboratories.

Richter, H. G., & Dallwitz, M. J. (2000). Commercial timbers: Descriptions, illustrations, identification, and information. Retrieved on various dates, from https://www-archiv.fdm.uni-hamburg.de/b-online/wood/english/thescwal.htm.

Shrestha, K. K., Bhandari, P., & Bhattarai, S. (2022). *Plants of Nepal* (*Gymnosperms and Angiosperms*). Heritage Publishers & Distributors Pvt. Ltd.

Stainton, J. D. A. (1972). *Forests of Nepal.* John Murray.

Suzuki, M., Noshiro, S., Takahashi, A., Yoda, K., & Joshi, L. (1991). Wood structure of Himalayan plants, II(pp. 5-62). In H. Ohba, & S. B. Malla (Eds.), *The Himalayan Plants* (Vol. 2). University of Tokyo Press.

Tropical Plants Database. (2025). *Schima wallichii* - Useful Tropical Plants. Retrieved on various dates, from https://tropical.theferns.info/viewtropical.php?id=Schima+wallichii