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Comparison of Fine Fibrous Characteristics of Stem, Branch and Root Wood from Royal Paulownia grown in South Korea.

Yue Qi^{1,2}, Wooseok Jeon^{1*}, Wahyu Hidayat^{1,3}, Jaehyuk Jang^{1,4}, Namhun Kim¹

¹College of Forest and Environmental Sciences, Kangwon National University, Chuncheon 24341, Republic of Korea

²Research Institute of Wood Industry, Chinese Academy of Forestry, Beijing, China

³Faculty of Agriculture, Lampung University, Bandar Lampung 35145, Indonesia

⁴The Institute of Forest Science, Kangwon National University, Chuncheon 24341, Republic of Korea

E-mail: wjsdntjr33@kangwon.ac.kr

Abstract

Royal paulownia (*Paulownia tomentosa*) is a fast-growing wood species in Korea. It is considered to be valuable resources for wood supply and carbon absorption. This study evaluated the anatomical and fine fibrous characteristics of stem, branch and root wood from the Royal paulownia for the potential utilization on the nanocellulose. Stem and branch wood showed similar anatomical characteristics that solitary vessels, distinct growth ring and ray cells with 2 to 4-seriate. However, the root part showed solitary and/or radial multiple vessels, indistinct growth ring and ray cells with uniseriate and 2 to 5-seriate. While making the microfibrillated products, branch wood consumed lower energy than stem and root wood. The total power consumption of stem, branch and root wood was 3897, 3031, and 4594 kW·h/kg, respectively. Fine fibers from branch wood took longer filtration time than stem and root wood, indicating that finer products. The filtration time in 10 passed sample of stem, branch and root part was 3.08, 3.38 and 2.75 min, respectively. Also, fine fibers from branch wood showed slender shapes than other parts. Although branch wood took shorter grinding time than stem and root, the dimensions of microfibrillated products from branch were similar with those of stem and root. Conclusively, it is considered that branch wood is more efficient material on the nanocellulose production than other parts.

Key words: nanocellulose, microfibrillated cellulose, fine fibrous, Royal paulownia, *Paulownia tomentosa*