Bioresource Technology 120 (2012) 40–44

Contents lists available at SciVerse ScienceDirect

Bioresource Technology

journal homepage: www.elsevier.com/locate/biortech

Improvement of bleached wheat straw pulp properties by using aspen high-yield pulp

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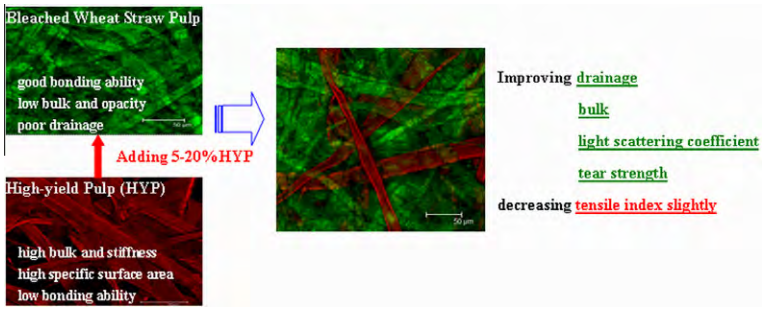
HIGHLIGHTS

- Addition of 5–20% aspen HYP into BWSP can improve its drainage and bulk obviously.
- Addition of HYP fibers resulted in more pores in the BWSP fiber network.
- Mixing BWSP with HYP had a synergistic effect on the light scattering coefficient.
- The BET surface area and micro-pore volume increased with increasing the HYP ratio.
- The addition of aspen HYP can significantly increase the tear index of BWSP.

GRAPHICAL ABSTRACT



ARTICLE INFO

Article history:
Received 2 May 2012
Received in revised form 9 May 2012
Accepted 5 June 2012
Available online 15 June 2012

Keywords:
Bleached wheat straw pulp (BWSP)
Drainage
High-yield pulp (HYP)
Light scattering coefficient
Strength properties

ABSTRACT

The bleached wheat straw pulp (BWSP) accounts for about 25% of the virgin fiber supply in the Chinese Pulp and Paper Industry. As a non-wood chemical pulp, BWSP is known to have low bulk, low light scattering coefficient and poor drainage due to its high content of parenchyma cells. In this study, a high-quality aspen high-yield pulp (HYP) was used to improve the BWSP properties at the laboratory scale. The results indicate that adding 5–20% aspen HYP into unrefined or refined BWSP can minimize many of the drawbacks associated with the BWSP: improving its drainage, bulk, light scattering coefficient and opacity. The addition of a small amount (up to 20%) of aspen HYP can also significantly increase the tear index of BWSP with only a slight decrease of the tensile index.

1. Introduction

Due to the shortage of forest resources in Asian countries, non-wood is one of the most important raw materials for pulp and paper production because of its abundance and cost-effectiveness. Many studies have been carried out on non-wood pulping, the resultant pulp properties, and their improvements (Ates et al., 2008; Fatehi et al., 2009; Hosseinpour et al., 2010; Jahan et al., 2007). By far, China is the biggest non-wood producer in the world, and wheat straw is the largest source of non-woods.

The Chinese Pulp and Paper Industry has been growing very fast in the recent 20 years; and the non-wood pulp fibers, including straws, bamboo, reeds, play an important role. Bleached wheat straw pulp (BWSP) is the main non-wood chemical pulp, and makes up more than 70% of total non-wood fibers in China (Hu et al., 2006b; Qin and Fu, 2007). BWSP is made of thin fibers with

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http://dx.doi.org/10.1016/j.biortech.2012.06.008