

Rapid processing of abandoned oil palm trunks into sugars and organic acids by sub-critical water

ABSTRACT

Abandoned oil palm trunk (OPT) is among the most abundant left-over biomass in Malaysia and is allowed to decompose naturally in the field. However, the recycling of OPT is less considered although OPT is a bioresource that has a high potential for conversion into value-added products. In this study, waste OPT was rapidly converted by hydrolysis using subcritical water (sub-CW). This work is the first attempt to explore the utilization of waste OPT based on the differences in moisture, cellulose and hemicellulose contents in the top and bottom segments, and from various ages of the waste OPT. 21- and 35-year-old OPTs were divided into top and bottom sections. The OPTs were subjected to sub-CW at a heating rate of 3.8 °C/s at various temperatures and times. The 21-year-old OPT was superior to the 35-year-old OPT for conversion into sugar and organic acid. The yield of the total sugar was between 0.41 and 0.77 kg/kg-OPT in the bottom and top sections. The excellent correlation between the sugar yield and sub-CW ion product (Kw) signified that the sub-CW facilitated the hydrolysis of hemicellulose and cellulose in the OPT. In the bottom segment, fructose had a higher yield, while in the top part glucose was dominant. Sugar degradation from the sub-CW treatment of OPT produced 0.2 kg/kg-OPT organic acids. The treatment of OPT using sub-CW showed promising results in producing sugars and organic acids.

Keyword: Oil palm trunk (OPT); Subcritical water (sub-CW); Hydrolysis; Sugar; Organic acid