

Effect of different alkaline treatment on the release of ferulic acid from oil palm empty fruit bunch fibres

ABSTRACT

Serious thought on sustainability of palm oil industry triggers ways to minimise the impacts caused to the environment by recycling oil palm empty fruit bunch (OPEFB). An alkaline treatment strategy was developed for ferulic acid (FA) release from OPEFB fibres. The selected treatment of autoclaving OPEFB (120°C, 3 hr) and hydrolysing it with 20 g kg⁻¹ NaOH (90°C, 3 hr) yielded 62.52±6.24 mg litre⁻¹ FA. Based on alkali selection (5 to 50 g kg⁻¹ of NaOH, KOH and K₂CO₃), 20 g kg⁻¹ KOH showed almost similar FA release to 20 g kg⁻¹ of NaOH, as it solubilised 56.94±3.52 mg litre⁻¹ FA. The addition of sodium bisulphite (NaHSO₃) resulted in an increase of 4.23 mg litre⁻¹ FA using KOH treatment. FA decreased when subjected to prolonged reaction times at high temperature, while at ambient temperature, only about 30 to 35 mg litre⁻¹ FA was released. Fourier transform infrared (FTIR) analysis showed evidence of decrease in aromatic groups, lignin and ester linkage stretching. The selected treatment method using 20 g kg⁻¹ NaOH and KOH solubilised 4.24 mg and 3.84 mg FA from 1 g of OPEFB lignin, respectively. From this finding, OPEFB exhibited a great potential as a feedstock for FA production. FA obtained from this treatment is very useful precursor for vanilic acid, vanillin and other value-added products formation through microbial conversion.

Keyword: Oil palm empty fruit bunch; Lignin; Alkaline hydrolysate; Ferulic acid; Sodium bisulphite