

Coagulative behaviour of *Jatropha curcas* and its performance in wastewater treatment

ABSTRACT

Alternative natural coagulants from *Jatropha curcas* seed and press cake were investigated for coagulative behaviors and abilities to treat real wastewater. The characterization of the seed and press cake was done by proximate analysis while characterization on extracts which contain the active coagulant agent was conducted using FTIR, amino acid analysis, and zeta potential. The coagulation performance was evaluated using Jar Floc test on palm oil mill effluent. Proximate analysis indicated that *Jatropha* seed contained more protein (54%) than press cake (28%). Through HPLC analysis, 18 types of amino acid were detected in *Jatropha curcas* (JC) seed and press cake extracts. FTIR results confirmed the functional groups that existed in all the amino acids. The zeta potential of the extracts was positive at $\text{pH} < 3$ and became negative as pH increased. This means that the bio-coagulant possessed net positive and negative charge at $\text{pH} < 3$ and $\text{pH} > 4$, respectively. Hence, the mechanism of coagulation at $\text{pH} < 3$ is due to adsorption and neutralization whereas at $\text{pH} > 4$, adsorption and interparticle bridging dominates. Dosages of 140 mg L^{-1} of *Jatropha* seed and 120 mg L^{-1} of press cake were required to treat 3500 NTU of POME to give 99 and 93% turbidity removal, respectively. *Jatropha* seed gave maximum turbidity removal at $\text{pH} 3$, while press cake at $\text{pH} 2$. The final pH of the treated POME was not altered greatly and the sludge produced was lesser in comparison to alum. In conclusion, the protein was the compound responsible for *Jatropha* coagulating behavior and its ability to treat real wastewater is promising.

Keyword: *Jatropha curcas* (JC); Press cake; Palm oil mill effluent (POME); Coagulation; Wastewater