IMMOBILISATION OF CELLULASE SYNTHESIZED BY *Aspergillus species* WITH *Persea americana* MATRIX AND ITS APPLICATION IN PALM OIL EXTRACTION

By

JEJELOLA, TOLUWALOPE JAMES (PG 17/0031)

B.Sc. (ILORIN), M.Sc. (IBADAN)

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ABSTRACT

ellulases are hydrolytic enzymes capable of hydrolysing cellulose to smaller sugar components. owever, to reduce cost of cellulase production and immobilization, an underexploited but)undant material such as kolanut pods and *Persea americana* seed can be used as substrate and ıpport material. The aim of this study is to immobilize cellulase produced by *Aspergillus species* ıd then use it to extract palm oil from palm pulp. The production of cellulase from isolated fungi: ;pergillus *niger* ACSIK-2101940, *Aspergillus oryzae* BJ-2, *Aspergillus flavus* MRI19 and ;pergillus *aculeatinus* SRG2 were investigated in submerged fermentation, with kolanut pod as rbon source, in a two-step process. In the first step, independent variables such as time of cubation, pH, temperature, inoculum size, agitation and different concentrations of kolanut pod, ;ptone, yeast, malt extract and urea were screened using Plackett Burman design. Subsequently,)x Benken design was employed to fine-tune significant independent variables so as to achieve ıtimum cellulase production. The crude cellulases were purified by a four-step procedure and)S-PAGE analyses were carried out to determine their molecular weight. Purified cellulases ;re immobilized, using *P. americana* seed as support, and applied in palm oil extraction. ıalysis of Variance test was used to test the relationship between the variables and means were parated using Duncan Mean Range Test. Significance was set at $p < 0.05$. Results showed that, r *A. niger* ACSIK-2101940, pH 7, temperature of 45°C, agitation of 125 and 120 hours of ;ubation were optimum for cellulase production. Also, pH 5, 45°C temperature, agitation of 100 d incubation time of 120 hours were optimum for production of cellulase by *A. oryzae* BJ-2. For *flavus* MRI19: pH 7, temperature of 35°C, agitation of 150 and incubation time of 120 hours ;re optimum for cellulase production. Likewise, pH 7, temperature of 45°C, agitation of 125 and ;ubation time of 120 hours were optimum for cellulase production by *A. Aculeatinus* SRG2. For rified cellulases of *A. niger* ACSIK-2101940 and *A. oryzae* BJ-2: pH 7 and temperature of 40°C

ere required for maximum cellulase activity. However, pH of 6.5 and temperature 40°C were quired for peak activity in purified cellulases from *A. flavus* MRI19 and *A. aculeatinus* SRG2. olecular weight of purified cellulase was found to be 65 KDa. Relative activities of 82.41%, .47%, 81.9% and 80.73% were retained at seven repeated cycles of cellulase beads of *A. niger* CSIK-2101940, *A. oryzae* BJ-2, *A. flavus* MRI19 and *A. aculeatinus* SRG2, respectively. mobilization yields of cellulases from *A. niger* ACSIK-2101940, *A. oryzae* BJ-2, *A. flavus* RI19 and *A. aculeatinus* SRG2 were 70.98%, 74.88%, 88.10% and 89.21%, respectively. rcentage oil recovery of 87.61%. 76.06%. 77.01% and 73.42% were obtained when 20 mobilized cellulase beads of *A. niger* ACSIK-2101940, *A. oryzae* BJ-2, *A. flavus* MRI19 and *A. uleatinus* SRG2 were used, respectively for palm oil extraction. However, for aqueous oil traction, percentage oil recovery of 32.46% was recorded. Conclusively, *Persea americana* eds showed potential as a polymer matrix for cellulase in extraction of palm oil.