Aqueous Enzymatic Oil Extraction from *Irvingia gabonensis* Seed Kernels

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*Irvingia gabonensis* (Bush mango) is a fruit tree distributed throughout West and Central Africa where his kernels are widely marketed. These kernels are predominantly constituted of lipids (51-72%) particularly rich in two saturated fatty acids: myristique C14:0 (33-51%) and laurique C12:0 (38-59%) of total fatty acids. The objective of this study was to extract the fat without organic solvent by using enzyme aqueous oil extraction process. The aqueous dispersion of kernels flour of mango was treated with a protease, a pectinase and a mixture of cell-wall-degrading enzymes (viscozyme®) before centrifugation. Then, the optimum conditions of viscozyme® were determined according to a central composite experimental design with three factors: the kernels flour to water ratio (w/v); the concentration of enzyme (v/v) and the time of incubation. Finally, the extraction of the oil was accomplished in the optimum conditions of viscozyme® followed by addition of a protease. The oil extracted yield was calculated in comparison with the chemical extraction using hexane as solvent. Results showed that the aqueous extraction without enzyme allows to recover 27,36% of kernels oil. When we add separately the protease, the pectinase and the viscozyme® we obtain respectively 34,86%, 42,24% and 67,97% of oil yield. The determination of the optimased conditions of viscozyme® resulted in a model of oil yield with a high coefficient of determination ($r^2 = 0,9395$). These optimum are the following: kernels to water ratio from 11 to 19%, concentration of enzyme from 1,4 to 2% and time of incubation from 14 to 18 hours. The confirmation of the model lead to 82,90% oil yield after a treatment of kernels flour in the ratio of 16% with a concentration of 2% of viscozyme during 18 hours. Treatment in these same conditions followed by addition of
protease in 1% of concentration during 2 hours gave a 89.63% yield. So, the aqueous enzymes oil extraction of Bush mango which allow to cover high quantity of oil consist, at first, to hydrolyse cells wall of the kernels flour blended in water in the ratio of 16% with viscozyme in 2% concentration during 18 hours. In a second time, add the protéase to this solution in 1% concentration and incubate during 2 hours then centrifuge to recover up to 90% of the oil, in comparison to chemical extraction.

Keywords: *Irvingia gabonensis*, Aqueous enzymatic oil extraction, Bush mango.