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Optimization of mechanical cacao shelling parameters using unroasted cocoa beans

Jeffrey Lavarias[1], **Jessie C Elauria**[2], **Arnold R Elepaño**[2], **Engelbert K Peralta**[2] and **Delfin C Suministrado**[2]
[1]Central Luzon State University, Philippines
[2]University of the Philippines Los Baños, Philippines

Shelling process is one of the primary processes and critical steps in the processing of chocolate or any product that is derived from cocoa beans. It affects the quality of the cocoa nibs in terms of flavor and purity. In the Philippines, small-scale food processor cannot really compete with large scale confectionery manufacturers because of lack of available postharvest facilities that are appropriate to their level of operation. The impact of this study is to provide the needed intervention that will pave the way for cacao farmers of engaging on the advantage of value-adding as way to maximize the economic potential of cacao. Thus, provision and availability of needed postharvest machines like mechanical cacao sheller will revolutionize the current state of cacao industry in the Philippines. A mechanical cacao sheller was developed, fabricated and evaluated to establish optimum shelling conditions such as moisture content of cocoa beans, clearance where of cocoa beans passes through the breaker section and speed of the breaking mechanism on shelling recovery, shelling efficiency, shelling rate, energy utilization and large nib recovery to establish the optimum level of shelling parameters of the mechanical sheller. These factors were statistically analyzed using design of experiment by Box and Behnken and Response Surface Methodology (RSM). By maximizing shelling recovery, shelling efficiency, shelling rate, large nib recovery and minimizing energy utilization, the optimum shelling conditions were established at moisture content, clearance and breaker speed of 6.5%, 3 millimeters and 1300 rpm respectively. The optimum values for shelling recovery, shelling efficiency, shelling rate, large nib recovery and minimizing energy utilization were recorded at 86.51%, 99.19%, 21.85 Kg/hr, 89.75% and 542.84 W respectively. Experimental values obtained using the optimum conditions were compared with predicted values using predictive models and were found in good agreement.

Biography

Jeffrey Lavarias is working as a faculty member at Central Luzon State University, Philippines.

jeffreylavarias@gmail.com

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