



# Sago Palm Flour Weight in Different Environmental Conditions: A Mathematical Model

Leo Manuel B. Estaña\*, Dianna Rose A. Enad, Joseph E. Acosta,  
and Kimberly Hazel B. Camino

University of the Philippines Mindanao

## \*Correspondence

Department of Mathematics,  
Physics and Computer Science,  
College of Science  
and Mathematics,  
University of the Philippines  
Mindanao, Mintal, Tugbok Distric,  
Davao City 8022, Philippines

T +63 82 293 0312

E lbestana@up.edu.ph

## Keywords

- ecological condition
- flour weight
- mean absolute percentage error
- potential starch yield
- sago palm (*Metroxylon sagu*)

## Abstract

For the past decades, the demand for starch from the sago palm (*Metroxylon sagu* Rottb.) from the starch industry is increasing because of the palm's high starch yield and low cost of production. This study presented a model which illustrates the relationship of sago palm flour weight with respect to its age depending on sago palm environmental condition (i.e., dry, wet, or submerged). Five different growth models were considered in this study, namely, the quadratic, cubic, quartic, power, and logarithmic models, which were ran using a metaheuristic approach, specifically genetic algorithm (GA), in order to estimate the weights associated with the independent variable age and to generate an estimate for the dependent variable flour weight. GA performance was measured using sum of squared residuals (SSR) as the fitness function while the accuracy of the models were measured using the mean absolute percentage error (MAPE). The results show that the best fit model for dry, wet, and submerged environmental conditions are cubic, cubic, and quartic models, respectively. The best fit models generated SSR values closer to the tolerance value of 0.000001 and have MAPE values of 2.820, 1.366, and 4.316, respectively, which indicate high accuracy. These models will help aide potential investors or land owners to identify the maximum potential starch yield of sago palm in areas where data with respect to growth stages are only available.