

Physical and mechanical properties of fresh and sterilized oil palm fruitlets

ABSTRACT

The outcome of this study is to determine the physical and mechanical properties of fresh and sterilized oil palm fruitlets as criteria for the use in the design of the mesocarp dehusker to separate the palm mesocarp from the nuts prior to screw-pressing process. Size, sphericity index, aspect ratio, true density, bulk density, and porosity are the attributes for physical properties that are being investigated in this study. For the mechanical properties, dynamic angle of repose, coefficient of friction and the work of shear/toughness are the attributes that are needed to slice the fiber strands of the mesocarp layer. The results were compared for fresh fruitlets and sterilized fruitlets at 121°C for 90 and 120 min and it shows that sterilized fruitlets yielded lower values compared to fresh fruitlets for the sphericity index, true density, bulk density, angle of repose, coefficient of friction, size, and work of shear/toughness needed to slice through the mesocarp for sterilized fruitlets. On the contrary, only the porosity value increases. This trend that was observed for sterilized and fresh fruitlets was also found for longer duration time of the sterilization process. The comprehensive results showed that the heat treatment brought about by sterilization process can weaken the structure of the fruitlets. The outcome of the study will not only be functional in design of oil palm processing machines but also in deciding the proper physical and mathematical model for the optimization of the processing operations.

Keyword: Oil palm fruitlets; Shearing force; Sterilization; Physical properties; Mechanical properties