

# Sterilization and Mechanical Digestion of Oil Palm Fruits [*Elaies Guinnensis*, Jacqin].

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## **Abstract:**

Investigations were carried out on the effects of sterilization on fruit recovery during palm oil extraction and the rupturing strength of the fruit mesocarp. Equations were developed for predicting power requirements of both the vertical and horizontal palm fruit digesters and the effects of both digesters in facilitating palm oil extraction were compared.

Fruit stripping was carried out after sterilization of freshly harvested fruit bunches and spikelets. The sterilization of the fruit samples was carried out in saturated steam at 100°C and 130°C for 15 to 120 minutes. The crushing strength of the fruit mesocarp was determined as a function of sterilization time and steam temperatures of 100°C and 130°C. Regression analysis was carried out on data collected from measurements of power consumption for the development of equations for the operation of the digesters. The effect of the digesters in facilitating palm oil extraction was compared in a 2<sup>5</sup> factorial design. The factors were: (1) Equipment (2) Orientation (3) Speed of operation (4) Content of the digester and (5) Sterilization condition.

The results of the experiments show that: (1) Palm fruit recovery is improved by processing spikelets in non-pressurized sterilizers and by processing fresh fruit bunches at 130°C in saturated steam.

(2) The crushing strength of palm fruit mesocarp decreases with sterilization time. The residual crushing strength is about 460 kN/m<sup>2</sup> and 580 kN/m<sup>2</sup> after sterilization respectively for 60 minutes at 130°C and 90 minutes at 100°C of saturated steam.

(3) Modeling equations were developed for design and operation of both types of digesters. The equations relate the power requirement to the mass of fruit charge, crushing strength of the fruit, diameter of cylinder and shaft speed of the digesters.

(4) Vertical orientation of the digesters and sterilization of the palm fruit at 130°C of saturated steam significantly improves palm oil extraction.

**Keywords:** Fruit/ sterilization/ palm oil extraction/ mesocarp/ digester/ fruit stripping/ spikelets

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