

# Characterization of the Breaking Behaviour of Whole Cocoa Pods

**J. N. Maduako and M. O. Faborode**

*Department of Agricultural Engineering, Obafemi Awolowo University, Ile-Ife, Nigeria.*

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## **Abstract**

This paper considers the mechanical breaking behaviour of whole cocoa pods, which is relevant to the development of machinery for their primary processing. In tests on four cocoa varieties, the relative contribution of the pod constituents, namely the pod husk, wet beans and placenta to the mechanical behaviour of the pods under a compressive load was evaluated. The effects of post-harvest storage on the breaking force for whole cocoa pods and the moisture content of pod husks were also determined. The results from the experiments were analysed to evaluate the stiffness modulus and toughness of a pod and the effect of variety and compression rate on these properties. For compression in the lateral axis, it was shown that the force-deformation curve was essentially linear, terminating at the maximum breaking force, while the curve for compression in the longitudinal axis was generally irregular. Furthermore, it was found that cocoa pods exhibit lower resistance to breakage by crushing in the lateral axis than in the longitudinal axis. However, the breakage resistance and other mechanical properties of the pod were not significantly affected by pod variety, compression rate and husk thickness. Because of the partial internal hollowness (or the shell-like nature) of a pod, most of the force required to break it was found to be dissipated in rupturing the pod husk, after which the undamaged beans are easily extracted. Copyright © 1994 Silsoe Research Institute. All rights reserved.

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