ABSTRACT

Development of a Mechanical Peeler
For Green Plantains

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Removal of skins from green mature plantains is labour intensive and costly. Factors, such as the time taken to peel, short green-life and cost of processing all contribute to the total cost of production. This in turn has affected the competitiveness of the product and consequently its commercial development.

In this thesis, an investigation of the physical and mechanical properties of green mature plantains (locally cultivated "Horse" plantain) relevant to the removal of their skins was undertaken. Usually, on average, after emergence of the inflorescence, it takes approximately 16 weeks for the fruit to be fully mature. Maturity is indicated by the roundness of the fruits' cross-section. Fully mature fruit has an almost perfect circular cross-section. This method of checking maturity is commonly used by local farmers and was also used as a check to ensure that samples used for testing were fully mature. Usually one fruit is cut and the section observed.

Physical properties such as weight, length, cross-sectional diameters, skin thickness, pulp to peel ratio and shape were measured. Mechanical properties such as force required to slit the skin, force required to separate the skin from pulp, the bio-yield of pulp and whole fruit and the co-efficient of friction between skin and rubber were measured. From these results design parameters were established which were used to design and fabricate a mechanical peeler.

The prototype plantain peeler consists of three rotating wheels and three cutting systems. The wheels are aligned at one hundred and twenty degrees to each other and serve to feed and slit the skin of plantains. The cutting system utilizes three part circular shaped stainless steel blades, which serve to lift and separate the skin from the pulp. All the three wheels and cutting systems are mounted on compression springs. These compression springs accommodate the variation in size of fruit. The peeled fruit falls into a chute for collection and the peel falls into a refuse tray. The machine requires one operator who will cut the ends and feed the fruit longitudinally into the centre of the rotating wheels.

The peeler has a capacity to peel 46 kg of plantains per hour. Testing of the machine, conducted at the laboratory indicated its great potential for commercial use. The machine produced an average percentage peel of 66.1 %, with a minimum percentage peel of 39.6 % and a maximum percentage peel of 100 %. Peeling done by the plantain peeler was found to be approximately four times faster than manual peeling.

Keywords: Miguel Jagessar; plantain peeler; design.