Title: Design, Fabrication and Evaluation of Melon Shelling Machine

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Abstract: Melon seeds are popular in the sub-Saharan Africa and Asia. Egusi as it is called is a popular fruit in Nigeria because of the edible seeds, which are commonly used in the preparation of local soup or stew and snacks. In Nigeria, farmers and other users of melon perform melon shelling through the cumbersome and wasteful manual methods. This study focuses on devising a better method for the removal of the shell to obtain the seeds. Results from preliminary investigations carried out on some physical and engineering properties of the pod seed were used in the design of the shelling machine. The machine consists of a frame, the hopper, the shelling chamber or unit made of a rotating impeller disc, rotor and the seed or discharge outlet. The shelling unit consists of a rotating impeller made of mild steel of 15mm thick. The discs are separated by vanes, 5mm thick, and 10mm high. The vanes are attached to provide a central feeding port of 70mm diameter and the seeds are confined to move between the vanes. The impeller is mounted horizontally on the vertical shaft, centrally positioned with a cylindrical ring of 360mm internal diameter and thickness 8mm.

The machine was tested with melon seeds at constant speed and feed rate, using moisture contents of dried seeds, 5%, 10%, 15%, 20% and 25% by weight (w.b). The melon shelling efficiency (MSE) increased as the moisture content increased, but beyond 20% w.b, there was a decrease. The maximum shelling efficiency was obtained at a moisture content of 20% w.b. as 84%.

The high shelling efficiency obtained in the shelling of melon and minimal loss has shown that there is a prospect in the mechanization of the processing and handling operation.