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Performance Assessment of a Locally Made Maize Sheller Machine – A Short Review

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Abstract:

Maize shelling is a critical post-harvest operation, and the exercise has impacts on the quality of the grain, the magnitude of the workforce, and the overall output. However, the manual procedure is time-consuming and inefficient, and this has led to the design and development of locally made automatic maize sheller machines. The brief review highlights the design and performance analysis on the efficiency, shelling rate, breakage, and energy requirement of the existing research on the design of the maize shellers.

Keywords: Maize sheller, shelling efficiency, grain breakage, shelling rate, locally made machine.

1. Introduction

Maize (Zea mays) is amongst the key cereals employed in food, animal feed, and industry. After crop harvesting, the grains require separation from the cob through the process of shelling. In manual processing methods for maize shelling, much time and manual labour are involved. Maize shellers will significantly optimize time and efficiency with minimal manual processing. Homemade maize shellers are not only cheap but ideal for semes too. Performance assessment of these machines will enable the optimization of their processes.

2. Review of Literature

Some studies established that the more the shelling speed is increased, the greater the shelling efficiency. However, increased speeds beyond a level lead to increased breakages. According to Adewole et al. (2015), increased speeds lead to improved shelling efficiencies. However, James et al. (2011) asserted that increased breakages of grains were obtained through higher speeds. Mady (2016) and Zaalouk (2013) established that locally made maize shelling machines help in labor reduction and reduced processing times. Other studies suggested that the amount of feed fed and water content affect shelling efficiencies and speeds.

3. Performance Parameters

Shell efficiency reflects the separative efficiency of grains and typically correlates with increased speed and time of shelling. The rate of shelling rises with increased speed of rotation and quantity of feed. The amount of grain brokenness rises with increased speed, as well as increased time of operation. Power and energy requirements increase with increased speed, quantity of feed, and time of shelling.

4. Discussion

From the reviewed literature, it is evident that machine performance is highly influenced by operational variables. A medium rate of shelling and feed rate ensures a good balance between efficiency and grain damage. High operational speed enhances efficiency and increases power requirements and grain damage.

5. Conclusion

The locally made maize sheller machines are cost-effective and efficient for use by small farmers. The machine operates at its optimal level at a medium speed of shelling, optimal feeding rates, and optimal time of sheling. The use of this machine increases efficiency and prevents losses.

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