Performance Evaluation of Maize Harvester for Economic Yield

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Introduction

Agriculture is one of the most significant sectors of the economy, which supplies food and raw materials for other industries. One of the most important staple crops in the world's food basket is maize, which is grown extensively around the globe. The promotion of homemade maize harvesters has drawn a lot of attention in recent years, in keeping with the government's goal of placing the nation among the top 20 economies within the next five years (Patil, S. A., & Wadatkar, A. S., 2018). Few institutions were established for farmers who wanted do automated farming, and many manufacturers have since launched a number of improvements based on the machine's steadily improving performance and booming demand. Among the changes observed are an increase in machine size, work rate, threshing efficiency, separation efficiency, and cutting efficiency, as well as a decrease in the frequency of gathering loss, grain damage, and operation fatigue. Other notable changes include ergonomics, auto setup, safety and comfort during operation, and, lastly, the electronics, which unmistakably demonstrate that the combine harvester has undergone a drastic transformation. According to the research study (Bhatnagar, 2018), the need for new knowledge in the design and optimization of local maize harvesters originates from the speculation of increasing efficiency in the local farmers' operations of maize harvesting. The development of local maize harvesters as light tools aimed at increasing the output, reducing costs of labor, and improving efficiency of maize harvesting has received considerable attention in recent years (P.K et al 2019). Manual harvesting takes a lot of time and effort translated to low output and costly workforce (Karmakar, 2019).

This paper addresses the old harvesting methods, which negatively impacts the productivity and profits of farmers thereby increasing the productivity and profitability of local farmers by modifying the existing mini maize harvester and carrying out a performance evaluation of the mini maize harvester that is affordable, effective, and simple to use

Materials and methods/Methodology.

The determination of the efficiency of the tiny maize harvester is archived by lowering the cutting blade's rotational speed using a set of gears, aligning the front and rear wheels, and introducing a control system for variable speed levels.

Results and discussion

At a blade speed of 757 rpm and a moisture content of 18%, the harvester notably showed the maximum cutting efficiency of 91%, suggesting that lower speeds and lower stalk moisture levels are optimal for optimizing harvesting performance. With an R-squared value of 0.8978, indicating strong model accuracy, the developed quadratic model offered a dependable fit for predicting maize yield based on time and speed variables.

Conclusions

The modified harvester achieved optimal cutting efficiencies at lower blade speeds, when stalk moisture was minimized. To improve the mini maize harvester's functionality, the machine should be operated on single rows in the form of ridges with interior spacing in accordance with the open space between the front wheel and the direction of cut of the rotary blade should shift to horizontal.

Keywords

maize, harvester, affordable, efficiency, and productivity