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Evaluation of Performance of a Double Knife Mower

By

Amal Ahmed Foad Salah

B.Sc. (Agr.Mech), Monofia University 1988

THESIS

Submitted in Partial Fulfilment of the

Requirements for the Degree of

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Department of Agricultural Engineering

Faculty of Agriculture

Monofia University

1995

Approved by

Salah E. A. Maksoud

M. M. El Awady

K. F. Hassan

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Supervision by

Prof.Dr Mohamed Nabil El-Awady M.N. El Awady

Prof.Dr Sayed M. Abdel Aal

Dr Mohamed . A. Abdel Maksoud M.Abd El Maksoud

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ABSTRACT

This investigation was carried out to evaluate the performance of the reciprocating double-action mower compared with the single-action mower as a mechanical method used in harvesting both wheat and barley crops, besides cutting cotton and corn stalks . The performance of the manually-method for harvestine is used also in the comparison . The investigation a imed to determine the more suitable equipment capable of harveste and cutting more than one crop under the Egyptian conditions.

Experiments were carried out in experimental plots at the Faculty of Agriculture Experimental Farm in El-Rahib for mowing both wheat , barley crops , cotton-stalks and corn-stalks by using a double action mower , a single action mower and manual harvesting . The performance of the mowers was tested under different variations of the following factors : type of mower , crop moisture content , rotating speed and forward speed .

The performance of the mowers was evaluated by calculating the following criteria : cutting efficiency , harvesting efficiency , field efficiency , the losses of crop and the total cost of harvesting . The obtained results showed that the combinations of type of mower , moisture content , rotary speed and forward speed affected significantly on the following parameters :

height of cut , mass of mowed crop , mass of standing stubble , grain losses , fuel consumption and harvesting time .

Also, it has been found that the machine productivity increased with increasing the forward speed and the actual field capacity parameters , fuel consumption , height of cut and grain losses which increased with increasing both the forward speed and the rotating speed .

Furthermore, it could be concluded that decreasing the crop moisture content increased the productivities of mowers and decreased the height of cut and grain losses . The total cost per unit area was the lowest by using the reciprocating mowers compared with using the hand tools at the low levels of moisture content for the mowed crops .

1- INTRODUCTION

The shortage of hand labour in Egyptian agriculture has become a pressing problem in recent years . This shortage , in turn, has lead to continuous cost increase of production in the field of agriculutre . Although harvesting is one of the most labor - consuming agricultural operations , yet harvesting machines are still not widely used in Egypt .

The poor economic conditions of Egyptian farms , are due to the small sizes of land holding .

Yet there is a shortage of farm labour in key seasons of agricultural operations , especially during harvesting periods. For this reason , Egyptain planners have turned toward concepts of increasing mechanization in farming operations to cope with seasonal shortage of laboure .

So, to overcome such problems , appropriate mowing systems have a good potential . Therefore , this study enables using mowers most suitable for Egyptian farm conditions to harvest various crops in order to decrease harvesting time and cost . This would enable farmers to sow the next crop without delay and make them independent of the labor, using Reciprocating action mowers (single knife mower , double knife mower) are included. Therefore , studies and investigations should be carried out on these machines in order to adapt and