

BSTRACT

The need is felt towards an inexpensive and dependable mower to suit the local conditions. So that, this study was carried out to develop and evaluate a simple rotary mower as a mechanical device used in mowing clover crop and cutting cotton and corn stalks. The mower was tested with three shapes of cutter blades, four forward and rotary speeds. Evaluation parameters were actual field capacity, field efficiency, cutting efficiency, fuel consumption, energy required and cost. The results obtained from this study showed that circular saw 80 teeth gave Actual field capacity 0.125, 0.13 and 0.121 fed/h; field efficiency 88.6, 89.7 and 87.1%; cutting efficiency 83.8, 95.4 and 87.8 %; fuel consumption 1.49, 1.71 and 2.35 L/h; energy required 39, 45.5 and 68.1 kw.h/fed; Cost 86.9, 85.9 and 98 L.E./fed. for mowing clover crop and cutting corn and cotton stalks respectively.

CONTENTS

I.	INTROUDUCTION	1
II.	REVIEW of LITERATURE	2
	2-1 Mower classification	2
	2-1-1 Forage harvesting	4
	2-2 Design consideration	8
	2-2-1 Cutting mechanism	11
	2-2-2 Cutting device components	15
	2-3 Physical and mechanical properties	16
	2-4 Machine performance and evaluation	18
	2-5 Operating speed	28
	2-6 Factors influencing cutting force, energy and power	33
	2-6-1 Moisture content	33
	2-6-2 Plant maturity	34
	2-6-3 Cutting speed	35
	2-6-4 Knife-edge angle	36
	2-6-5 Knife sharpness	36
	2-6-6 Rake or chip angle and clearance angle	37
	2-6-7 Other design factors	38
	2-7 Economical considerations	39
	2-8 Evaluating and testing the products of cutting	41
	2-8-1 Cutting height	41
	2-8-2 Quality of cut	41
	2-8-3 Wear and durability of cutting tool	42
III.	MATERIALS and METHODS	44
	3.1 Construction of the mower	44
	3.1.1 Design criteria	44
	3.1.2 Specification of the modified mower	45
	3.2 Test procedure	54
	3.2.1 Laboratory test	54
	3.2.2 Field tests	54
	3.2.2.1 The experimental design	59
	3.3 Measuring instruments	59
IV.	RESULTS AND DISCUSSION	60
	4-1 Field capacity	60
	4-1-1 Clover crop	60
	4-1-2 Corn crop	64
	4-1-3 Cotton crop	66
	4-2 Field efficiency	73
	4-2-1 Clover crop	73
	4-2-2 Corn crop	77
	4-2-3 Cotton crop	81
	4-3 Cutting efficiency	85
	4-3-1 Clover crop	85
	4-3-2- Corn crop	87
	4-3-3 Cotton crop	93
	4-5 Fuel consumption	98
	4-5-1 Clover crop	98
	4-5-3 Corn crop	99
	4-5-3 Cotton crop	100

II

4-6 Energy required	104
4-6-1 Clover crop	104
4-6-2 Corn crop	109
4-6-3 Cotton crop	113
4-7 Cost evaluation	117
4-7-1 Clover crop	117
4-7-2 Corn crop	122
4-7-3 Cotton crop	126
4-8 Evaluation of cost by using traditional methods and the small rotary mower.	131
4-8-1 Manual cutting	131
4-8-2 Reciprocating mower	131
V. SUMMARY AND CONCLUSION	132
VI. REFERENCE	135
VII. APPENDIX	147
VIII. ARABIC SUMMARY	