5—SUMMARY AND CONCLUSSIONS

This study was carried out at Quwesna Agricultural Mechanization Station to develop a front mounted mower (Prototype) and also to improve the rear mounted mowers widely utilized in Egyptian argiculture. During 1986, a prototype of front mounted mower was developed, then in 1988-1989 a conveying belt for imporving the performance of rear mounted mowers was designed and tested.

The front -mounted mower (Prototype) and the conveyor for rear mounted mower were developed in order to overcome some harvesting problems that usually Occure when either self-propelled mower or tractor rear-mounted ones are used resp.

Both of the improved equipement were tested and evaluated comparing with the other of mowers under actual field conditions during 1987- 1989. The selected field crops for mowing trials were wheat and cotton .

The developed mowers were constructed and attached to a 30 Hp agricultural tractor (koubota).

For the front mounted mower (prototype) the source of power was taken from the front p.t.o of the koubota tractor through bevel gears to transmit the power from the crankshaft to the connecting rod of a single knife mower.

A normal single knife bar of 127 cm wide with its sides and connections (as normally used in self propelled machines) was adapted and reassembled to be mounted on a specially made frontal hydrqulic hitching. The selected differential system was of speed ratio of about 5 : 1.

In winter of 1988, a rear -mounted mower was improved by designing a conveyor consisting of a wide belt (100 x 150 cm) moving on two drums (7.5 cm diam. and 100 cm length).

The conveyor was attached to the mower frame and it took its drive power from the crank shaft of mower through two transmission gears giving a speed reduction of 3 : 1 (4cm : 12 cm diameteres) . The designed linear speed for the conveyor was 118 m/min. at 500 r.p.m. of the p.t.o. and 4.2 km/h. tractor forward-speed. This conveying system served to overcome the main disadvantages of the rear-mounted mowers which is the high cost of labor needed for clearing the harvested wheat from the next tractor swath .

The developed mowers were -tested and evaluated comparing with the other two types of mowers: a) tractor rear-mounted mower (Busatis B.M 1102 W-GERMANY manufactured B) self propelled mower (FERRARi 702 ITALIAN) under actual field conditions during 1987-1989.

Each type of mowers was tested under its recommended speed except the prototype which was tested under two different engine-speeds with three different gear variations I, II and III resultuing in 6 different forward speeds. The variation in engine speeds were selected to suit the type of crop and field surface -conditions.

The results indicated that:

1- The average field capacities for front mounted mower (Prototype) were 0.589 and 0.529 fed/h./meter of cutter bar width for harvesting of wheat and cutting stalks of cotton resp.

The average field capacities for self-propelled mower were 0.407 and 0.342 fed./h./meter of cutter bar width for the harvesting of wheat and the cutting stalks of cotton resp.

The average field capacities for tractor rear mounted mower were (0.736 and 0.65 fed/h./meter of cutter-bar width) for harvesting of wheat and cutting stalks of cotton resp.

2- The average field efficiencies for self-propelled mower were very low since they were 55.2 % and 57% for cutting stalks of cotton and harvesting wheat resp., while they become slightly high for both of the prototype and the rear -mounted mowers, (67.2% and 73.82 %) for the

prototype and (70.2% and 74%) for the rear mounted mower for cotton and wheat resp.

3- The prototype showed better results in the cutting and harvesting efficiency by about (6%) more than self-propelled mower and by about 4% more than rear mounted mower since the cutting efficiency for the three mowers were 96%, 90 % and 92 % resp.

4- The average heights of cut for the prototype were 4 and 3.65 cm for cotton and wheat resp., 12 and 10 cm for self -propelled mower, and 7.5 and 6.5 cm for rear mounted mower resp.

5- The harvesting cost of wheat for the prototype was less than that for the self -propelled mower and rear mounted mower since their operating costs were 7.7 , 14.9 and 17.7 L.E/fed resp. This cost variation was mainly due to the cost of labor needed for collection of the harvsted wheat during the operation of the rear-mounted mower (2 labours . h /fed.)

6- The cutting cost of cotton stalks widely varied from 6.42 L. E./fed using the rear-mounted mower to 8.09 L.E./fed, and 17.77 L. E./fed when using the prototype (front mounted) and self-propelled mowers resp.These data indicate that rear -mounted mower was economically favorable machine to cut cotton stalks while self-propelled mower was the most expensive machine to cut

cotton stalks since its cost was almost equal to the cost of manual cutting was (22 L.E. /fed. on the basis of 1989 prices) .

Test of the improved rear mounted mower resulted in the following conculussions :-

The improved rear -mounted mower had the best results in most of the evaluation parameters since, its field capacity reached 1.19 fed/h., its field efficiency was 80 % its cutting height was 4 cm, its harvesting losses was 4 g/m2 , and its harvesting cost was 6.83 L.E/fed.

The only one disadvantage of the improved rear mounted mower is the manual harvesting needed at the begining of operation to clear a swath for tractor around the field , inspite of that the rear mounted mower with conveyor is considered of favorable machine for Egyption agriculture conditions. . This improvment wil decrease the harvesting cost spent in man power required continuously, after normal rear mounted mowers also. it will raise the efficiency of the recent number of mowers used in egypt.