



Testing a Locally Assembled Combine Implement Used for Open Furrow, Planting and Fertilizing under Different Machinery Unit Speeds

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ABSTRACT

The experiment was conducted for testing a locally assembled combine implement used for open furrow, planting and fertilizing under different machinery unit speeds. New Holland TD80 tractor was used in this study. Three machinery speeds included 6.26, 7.44 and 9.53 km/hr which represent main plot and two Furrow depths included 5-15 and 15-25 cm which represent sub plot were used in this study. Field efficiency, Leaf area, 100 seed weight, percentage of oil in maize and maize yield was measured in this experiment. Split plot design under Randomized Complete block design with three replication was used in this study. Least significant differences (L.S.D) under 0.05 level was used to compare the mean of treatment. The results can be summarized as Follow: 9.53 km/hr speed gave lower field efficiency stood 63.45% and higher maize yield stood 9.65 t/h. 5 - 15 cm furrow depth gave higher field efficiency stood 69.01% and greater leaf area stood 0.57 m² while 15-25 cm furrow depth gave higher maize yield stood 5.23 t/h. The interaction between speed and furrow depth, has significant effect on all plant properties except 100 seed weight and percentage of oil in maize. Using the locally assembling combine implement for planting, fertilizing and open furrows is successfully done.

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1. Introduction

Combine equipment for open furrows, planting and fertilization is very important implement used to carry out more than one process at the same time where the combine equipment open suitable furrow to grow any crop and also considered as special tillage implement (Jasim and Madloul, 2011).

An experiment was conducted at University of Iowa to plant maize by furrows and led to an increase in total production (Frank et al, 2012)

The maize leaf plant area is essential for being a factory which able to capture the light and take advantage of it for the manufacture of basic materials in the plant life and crop production (Watson, 1952).

Machinery unit operation speed is one of important factor that can effect on soil, regardless of how it's done, So that, these operations be appropriate and they can have a positive impact on the soil properties and moderate the pressure on the soil. Otherwise inappropriate operation speeds will provide conditions in the soil which are providing the groundwork for the destruction of soil structure, loss of nutrients and environmental pollution (Jasim, et. al., 2015).

To assure normal plant growth, the soil must be prepared in such conditions that roots can have enough air, water, and nutrients. Soil tillage is among the important factors affecting soil physical and mechanical properties (Mustafa and Nihat, 2007). Soil physical properties change not only because of constructional properties of soil tillage implements, but also because of their operational variables, such as operating speed.

Jiantuo et al, (2010) reported that the designing implement which used for maize cultivation on furrow gave higher practical productivity, as well as reduce the time.

Coates, (2002) mentioned that the field practical productivity is affected by several factors such as speeds and other field processing.

Corn is one of the cultivated crops for grain and fodder with tremendous yield potential grown round the year under irrigated condition. In many parts of the world, maize is the most important food stuff and particular, provides the daily bread for the indigenous population of rural area. Corn has become a widely grown feed particularly as a second crop after wheat or barley.

According to the importance of testing and using the locally assembled combine equipment in production of maize crop under different machinery speeds, this study was conducted.

2. Materials and Methods

The experiment was conducted for testing a locally assembled combine implement used for open furrow, planting and fertilizing under different machinery unit speeds. Three machinery speeds included 6.26, 7.44 and 9.53 km/hr which represent main plot and two furrow depths included 5- 15 and 15-25 cm which represent sub plot were used in this study. Field efficiency, leaf area, 100 seed weight, percentage of oil in maize and maize yield was measured in this experiment. Split plot design and randomized complete block design with three replication was used in this study. Least significant differences (L.S.D) under 0.05 level was used to compare the mean of treatment. A New Holland TD80 tractor was used in the study.

Speed km/h	Depth of furrow (cm)		Average
	515–	– 2515	
6.26	14.52	13.74	14.13
7.44	15.61	14.20	14.90
9.53	16.45	14.57	15.51
L.S.D	N.S		N.S
Average	15.53	14.17	
L.S.D	N.S		

3.4. Corn Oil %

Table (4) showed no significant impact of the machinery speed and furrow depths and interaction between them on corn oil percentage.

Table 4. the effect of the machinery speed and furrow depths on corn oil percentage.

Speed km/h	Depth of furrow (cm)		Average
	515–	– 2515	
6.26	2.32	2.87	2.59
7.44	3.31	3.55	3.43
9.53	4.01	4.11	4.06
L.S.D	N.S		N.S
Average	3.21	3.51	
L.S.D	N.S		

3.5. Corn Yields, ton/hac.

Table 5. Shows the effect of machinery speed and furrow depths on the corn yield. 9.53 km / h machinery speed showed the superiority in the corn yield stood 10.12 ton/hac compared with 6.26 km/h speed which got 3.75 ton/hac. The reason for that may be due to the increase in soil tillage which gave good condition for plant growing and increase in the leaf area of the plant. 15-25 cm furrow depth got higher corn yield stood 5.23 ton/hac while 5-15 cm furrow depth got 3.47 ton/hac. May be the reason for that due to the availability of irrigation water for the bigger size of the furrow. Where it was found that the impact of interference between the speed and the furrow depths got a significant effect on the corn yields. The overlap between 9.53 km / h speed and 15-25 cm furrow depth got the highest corn yields amounted to 5.91 ton/hac ,and the lowest corn yields achieved 2.86 ton/hac for the overlap of Speed 6.26 km / h with a depth of 5-15 cm.

Table 5. The effect of the machinery speed and furrow depths on the corn yields, ton/hac.

Speed km/ h	Depth of furrow (cm)		Average
	515–	– 2515	
6.26	2.86	4.64	3.75
7.44	3.34	5.14	8.48
9.53	4.21	5.91	10.12
L.S.D	3.54		1.02
Average	3.47	5.23	
L.S.D	2.32		

4. Conclusion and recommendation

Using the locally assembling combine implement for planting corn, fertilizing and open furrows is successfully done. Through the above results it is clear that increased tractor speed led to significant decrease in field efficiency, leaf area, and significant increase in corn yield. Also increase furrow depth led to significant decrease in field efficiency, leaf area, and significant increase in corn yield. Therefore, we recommend using a 9.53 km/ h speed and 15-25cm depth treatment which gave the best plant yield.

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