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ESTIMATING RENAULT TRACTOR COSTS USING DIFFERENT DEPTHS AND AGRICULTURAL MACHINES

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ABSTRACT

The experiment was carried out in one of the fields of the Agricultural Research Department affiliated to the Ministry of Agriculture in Abu Ghraib in the year 2022 for the purpose of calculating the total costs of the Renault type tractor and studying the effect of three different equipment represented by the disc softener, masher and seeder and three levels of depths of 5 cm, 10 and 15 cm on the performance of the type tractor (Renault has been studied) overall economic costs, The Randomized Completely Block Design (RCD) system was used, and the results were analyzed using the Least Significant Difference (LSD) method at the level of 0.05 and compared with the averages of the coefficients. The results showed the following:

1- Changing the type of machine from disc harrows to packers and then to seeders led to a significant decrease in the total costs from 24119 to 24055 and then to 19793 (D.ha -1).

2- Increasing the depth from 5 to 10 and then to 15 led to a significant increase in the total cost of the mechanical unit from 22521 to 22678 and then to 22768 (D. hectare -1).

3- The overlap between the disc harrows and the depth of 15 cm led to recording the highest value in the total costs, which was 24245 (D. Ha-1).

As for the overlap between the seed and the depth of 5 cm, it led to recording the lowest value in the total costs, and it was 19639 (D. ha- 1).

Keywords: Costs, Disc Harrows, Packers, Seeder.

تقدير تكاليف الجرار نوع Renault باستخدام أعماق والالات زراعية مختلفة

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الخلاصة

نفذت التجربة في أحد حقول دائرة البحوث الزراعية التابعة الى وزارة الزراعة في ابي غريب في شهر العاشر لسنة 2022 لغرض حساب التكاليف الجرار الكلية نوع Renault ودراسة تأثير ثلاث معدات مختلفة متمثلة بالمنعمة القرصية والهارسة والباذرة وثلاثة مستويات من الأعماق 5سم و10 و15 سم في أداء جرار نوع (Renault) وتم دراسة التكاليف الاقتصادية الكلية، استعمل نظام تصميم القطاعات العشوائية الكاملة (Randomized Completely

[*] The research is taken from a master's thesis by the first researcher.

Block Design (RCBD، وتم تحليل النتائج باستعمال طريقة اقل فرق معنوي (LSD) عند مستوى 0.05 ومقارنتها مع متوسطات المعاملات، وأظهرت النتائج ما يلي:

1- إن تغيير نوع الآلة من الامشاط القرصية الى الهارسة ومن ثم الى الباذرة ادى الى انخفاض معنوي في التكاليف الكلية من 24119 الى 24055 من ثم الى 19793 (دينار. هكتار -1).

2- أدت زيادة العمق من 5 الى 10 ومن ثم الى 15 الى زيادة معنوية في التكاليف الكلية للوحدة الميكنية من 22521 الى 22678 ثم الى22768 (دينار. هكتار -1).

3- أدى التداخل الحاصل بين الامشاط القرصية والعمق 15سم الى تسجيل أعلى قيمة في التكاليف الكلية كانت 24245 (دينار. هكتار-1).

أما التداخل بين الباذرة والعمق 5 سم فقد أدى الى تسجيل اقل قيمة في التكاليف الكلية وكانت 19639(دينار. هكتار -1)

الكلمات المفتاحية: التكاليف، الباذرة، الكلفة الكلية.

INTRODUCTION

Agricultural mechanization is the main pillar of agriculture in our modern area, and it plays a fundamental and effective role in increasing agricultural production and providing food for the world's population, which amounted to 7.4 billion, according to the United Nations estimate in 2015 **(Alain Parant, 2016).** With the increase in population numbers and urban progress, the need to provide food increased, which It led to an increase in cultivated areas and an increase in the attempt to raise productivity per unit area in order to provide the largest possible amount of food and effort. **(Laibi, 2022)** Despite this, the quantities produced remained insufficient to meet the needs of the increasing numbers of the population for two main reasons, the first of which is the insufficiency of cultivated land to meet the need, and the second is the low production per unit area.

The speed of conducting the plowing process is of great importance in increasing productivity, but increasing the speed above a certain limit led to increased stress on the puller and the machine, as well as the lack of control over the depth of plowing leads to poor plowing conditions and depths. It results in low productivity (uneconomical) and reduces the efficiency and depth of the tillage process as well. The forward speed is an important and direct factor in improving plant productivity in quantity and quality.

MATERIALS AND METHODS:

1. Experimental Procedure

The experiment was carried out in one of the fields of the Agricultural Research Center in Abu Ghraib in the tenth month of the year 2022 for the aim of Estimating Renault tractor costs using different depths and agricultural machines.

2. Executing the experiment:

The experiment was carried out using Statistical Analysis System (SAS, 2012) in data analysis to study the effect of different factors on the studied traits according to an experiment (3 * 3), (totally 27 treatment) applied with a complete randomized design (RCBD Randomized Completely Block Design).

the significant differences between the averages were compared with the least significant difference test (LSD) 0.5%.

The research relied on a study of two factors, namely:

The first factor: the type of implements with three levels: disc harrows by (I1) as shown in Figure No. (1), the packers by (I2) and as shown in Figure No. (2), and the seeders by (I3) as shown in Figure No. (3).

The second factor: the depth in three levels: 5 cm (D1), 10 cm (D2), 15 cm (D3).

Image (1): Disc Plow.

Image (2): Packers.

Image (3): Seeder**.**

1. Total costs (D. ha^{-1}):
The total costs were calculated according to the method adopted from (**Al-Tahan *et al.*, 1991),** Al-Ani (2020) and **(SAHAY, 2010).**

2. Depreciation or consumption:
Depreciation or depreciation can be calculated from the following equation:
Amortization or depreciation costs = tractor purchase price - selling price / (operating life in hours)
D = P-S/

3. Interest
It is calculated from the following equation.
Int= (P+s / 2) / L *0.1

4. Taxes, insurance and shelter:
Its value was calculated from the following equation:
Ist = P/L * 2%

5. Variable costs:
Variable costs are defined as the costs that change relatively with the amount of work produced on the machine, or in other words, they are the costs as a result of operating the machine, so they increase with increasing operation and decrease as the operation of the machine decreases **(Al-Tahan 1991).**

6. Fuel costs:
It is calculated using the following equation **(Al-Khafaji 2001).**
Fu.c=BHP * 60% * 25% * FP

7.Oil cost:
It is calculated using the following equation **(Al-Khafaji 2001).**
OC=BHP * 60% * 25% * 0.03 * Fo

8. Maintenance and repair costs:
It is calculated using the following equation **(Al Tahan 1991):**
M.R.C=P/h*Ppr *(M.R.) Rate

9. Labor cost:
It is calculated using the following equation: **(Al-Khafaji 2001)**
L.c=Dl/d*Pr
The variable costs of the tractor are calculated according to the following equation:
V.c = Fu.c + O.c + M.R.c + Lc

10. Management costs:
Management costs are calculated as a percentage (10%) of the total fixed and variable costs of the tractor, using the following equation:
Ma.c=(F.c V.c)*0.10

11. Total costs of the tractor:
It is the sum of the fixed, variable and administrative costs of the tractor and is calculated using the following equation:
T.t.c = F.c + V.c + Ma.c

12. The total costs of the equipment used in the experiment:
The fixed, management and total costs of the equipment were calculated using the same equations that were used in calculating the economic costs of the tractor.
With the exception of the variable costs of the equipment, which were calculated as a percentage of (80%) of the fixed costs for each equipment, using the following equation **(Al-Tahan, 1991)**
P.V.c=P.F.c*0.08

13. Total unit costs:
It is the sum of the total costs of the tractor and the total costs of each equipment (plow + packers+ seeder) and is calculated using the following equation
T.c1=T.Tc+P.Tc1
T.c2 = T.t.c + P.T.c2

RESULT AND DISCUSSION:

Total costs (D. ha- 1)

Table (1) shows the effect of each of the type of machine and the depth on the characteristic of the total costs, as it is clear from Table (1) that changing the type of machine had a significant effect on the characteristic of the total costs, as it was found that the total costs of the disc harrows were 24119 D. ha-1 and for the masher were 24055 D. ha-1 and when using the seeder , the total costs decreased to 19793 D. ha-1 The reason is attributed to the increase in practical speed due to the decrease in weight, which leads to an increase in productivity as a result of it, and this leads to a decrease in costs. This is consistent with **(Jassim and Al-Hashemi, 2015)** and **(2003 Mosad and Foudy)**.

Table (1): Represents the effect of each of the machine type and depth on the total costs (D. ha-1).

Implement	Depth			Mean Implement
	D1 (5سم)	D2	D3	
I1(المنعمة القرصية)	23957	24156	24245	24119
I2 (الهارسة)	23966	24152	24046	24055
I3(الباذرة)	19639	19726	20013	19793
LSD I*D	300.21 غ.م			156.77
Mean depth	22521	22678	22768	
LSD D	199.26			

From the same Table No. (1) that increasing the working depth from 5 to 10 and then to 15 cm for the seeder led to an increase in total costs from 22521 to 22678 and then to 22768 D. ha-1, the reason for the increase is due to the increase in the percentage of slippage, and this leads to a decrease in the practical speed, which is one of the components of productivity, and these results are consistent with **(Mankhi 2012; Jassim & Al Hashemi 2015).**

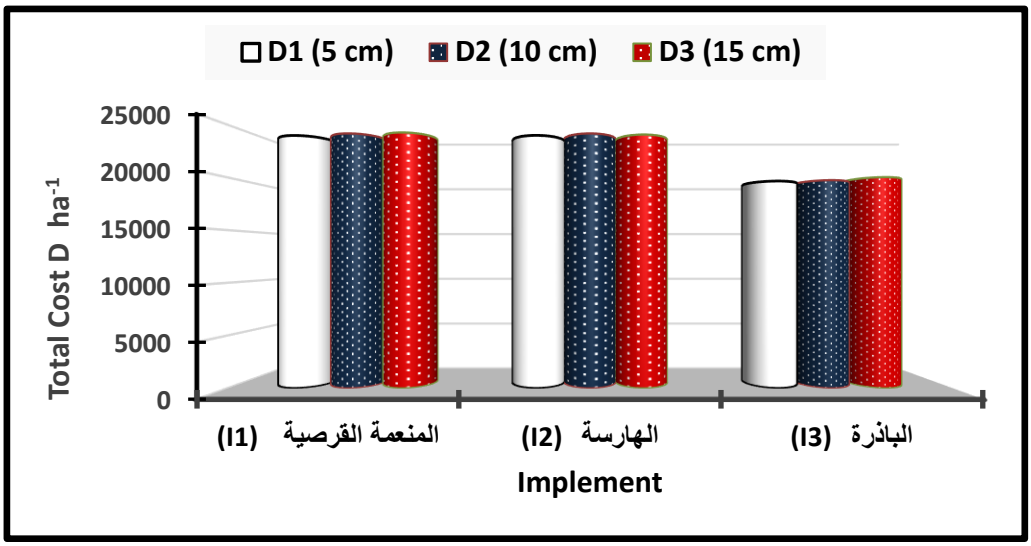

Figure (4): The effect of each type of machine and depth on the total costs.

As for the bilateral overlap between the plowing depth and the machine, it was also clear from the same table above that the highest total costs were using disc harrows with a depth of 15 cm, which was 24245 D. ha-1, while the lowest total costs were recorded when working at a depth of 5 cm using the seeder 19639 D. ha-1.

CONCLUSIONS:

The results showed that the overlap between the lowest rate of the total costs for the used puller, and the highest rate of field productivity and field efficiency.

RECOMMENDED:

We recommend using different depths and measuring the studied characteristics in the research.

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