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Cansa planter performance of its work and its effect on some mechanical and agricultural characteristics

Galib A. Alkaabi

Shatrah Technical College, Sothern Technical University, Iraq

*Corresponding author email: ghaleb.muhaibis@stu.edu.iq

Walid A. H. Al-Sheikh

Shatrah Technical College, Sothern Technical University, Iraq

Ghufran S. Al-Azzawi

Shatrah Technical College, Sothern Technical University, Iraq

Abstract---A field experiment was conducted in one of the fields of the Technical Institute in Shatrha 2022 to study the Cansa planter performance of its work and its effect on some mechanical and agricultural characteristics, on some performance indicators of an emergence percentage, distance between seeds, fuel consumption and slippage percentage. Three levels of a tractor practical speed (2.1, 3.2, and 4.5 km/h), and two levels of a depth of cultivation (3 and 5cm) with three Replication according to the Completely Randomized Design was applied. The results showed that the tractor velocity 2.10 km / hr recording the highest average emergence percentage of 92.05% and the lowest average distance between the seeds amounted to 14.5 cm and the lowest slippage percentage to 12.70%, while the tractor velocity 4.50 km / hr recording the lowest fuel consumption amounted to 0.50 liters / acres and the depth was 3 cm recorded. The highest average eruption rate was 94.20%, the lowest slippage percentage was 15.23%, and the lowest fuel consumption was 0.76 liters / dunum. The depth of 5 cm achieved the lowest distance between the seeds, which amounted to 14.90 cm.

Keywords---fuel consumption, slippage percentage, tractor speed, emergence percentage.

Introduction

The materials that planter deal with in general are seeds and soil. The seeds are characterized as being the solid part of the plant, and the degree of their hardness varies between different types of plants and sometimes within the same crop. There are many characteristics of the seeds in order to raise the level of exploitation according to the task of the design machine Al-bnaa&hassan1990. (Pannining et al., 200) mentioned that the cultivation process is one of the tasks carried out by corn farmers so that the plants have a homogeneous density, good growth, regular spacing and a high germination rate. One of the most common characteristics for evaluating the performance of planters and reducing mechanical damage to seeds is the possibility of placing seeds at equal depths, as well as ensuring seed coverage and uniformity of seedling emergence (Nave & Paulsen.1979).

The mechanism of action in the micro-planter , including the gansa planter, is used in precision farming, so that the distances between one seed and another are set on the same line. As for its effect on small and medium-sized seeds, it will be almost non-existent(Siddiq&Al-Shiekh2016. ;Al-rajpo&Al- sndwoq 2012). The germination percentage is the percentage of the number of seeds emerging from the total number of seeds in the ideal germination conditions and the germination period is the time period between sowing seeds in the soil and the emergence of the first plant. Al-Khafaji (2009) that the percentage of emergence and the speed of emergence in field crops, including yellow corn, varies according to a number of factors, including the type of seeds, their size and the depth of seeding, which will affect the plants later . (Mohammad & Jlal, 2020) showed that the type Research 70 giving the highest average percentage of emergence of 54.2 and 62.5% and that the lowest average for the type enqith 44.6 and 55.0% and that the activated seeds gave the highest average of the inactive seeds 54.6 and 64.0% and attributed the reason to the percentage of Emergence increases with an increase in the speed of emergence or the beginning of emergence, and this indicates the strength and vitality of the seeds. As a result of the weak field establishment (decreased rate and speed of emergence) that accompanies its cultivation and is a major reason for the decline in yield, especially in dry areas and its arid saturation Abandani &Ramezani .2011. There are many studies that shed light on the existence of a significant difference between the percentage of laboratory germination and field emergence of plants (Cheyed, 2008 and Ali2016 & Hamza).

Al-Rajbo et al. 2002) indicated that increasing the tractor speed could lead to rolling of the seeds from the seed bed and thus affect the heterogeneity of the seed distribution in an orderly manner. (Abdal-Rahman 1992.& Al-ani et al ., 2004&) emphasized that increasing the seeding speed to more than 8 km/h is accompanied by an increase in slipping within the permissible limits with the instability of the mechanical unit and the difficulty in the direction of the movement of the seed and its deviation from the correct path. The amount of slippage is always expressed as a percentage, where it is normal and continues to work if the technical conditions and specifications are applied through which it is possible to maintain a slippage percentage of less than 15%, because the excess of this limit becomes uneconomical and work conditions must be improved (Apostoloulos. 2001). . The fuel consumption is one of the important

characteristics in evaluating the performance of the tractor and the machine, which expresses the amount of fuel consumed by the tractor when completing any agricultural operation of its various types (Aday . et al., 2007. ; Wong 2002; 2010; Macmillan 2010) . the importance of studying the performance of the Gansa planter and its effect on some agricultural and mechanization traits for growing corn seeds and evaluating its performance using different tractor speeds and different planting depths. the entry of many agricultural machines into Iraq, which are imported by merchants, and which are not subject to measurement and quality control, which determines the validity of this machine to work in Iraqi lands, which of course is different from the land of the state in which these machines were manufactured, which are suitable for them, and the failure of work has appeared Many of these machines after being imported, which lead to losses for the farmer.

The aim of the research

It is to determine the validity of the planter work in the conditions of Iraqi agriculture with the selection of the best organizations that give the best working performance.

Materials and Methods

The experiment was carried out in one of the fields of the Technical Institute in Shatrah 2022. The land was tillage with a disc plow, primary tillage , then smoothing with a desk harrow, after which the leveling was done using two half-mounted leveling . The planting process was carried out and the machine was calibrated at a distance of 14 cm between one seed and another (theoretical distance). The number of seeds per meter per line is 7 seeds, which is equivalent to 23,330 seeds per acre. The theoretical emergence rate through planting them manually is 95%, by planting 20 seeds, which is the same as Present on the seed bag. The results were statistically analyzed and significant differences were tested using the least significant difference (LSD) method at the probability level (0.05) General treatment structure under randomized block design (RCPD). With three replication were used in this experiment .The main plot included the tractor's speed in three levels: 2.1, 3.2 and 4.5 km / hr and the second factor and two levels of a depth of cultivation (3 and 5 cm) The tractor used the Massey FOREXN and the CANSA PLANTER of combine drill of the mounted type behind the tractor with four rows and a disc coulter , and its weight was 800 kg.



Figure 1. Components of cansa planter on study

Studied indicator:-

$$V_t = (M/t) \times 3.6 \dots\dots\dots(1)$$

VT: velocity theoretical (km.h-1).

M: Ditrmined distance (m)

t: time (second)

Slippage percentage (%)

It is measured according to the following equation suggested by (zoz)

$$SP = \frac{V_t - V_p}{V_t} \times 100 \dots\dots(2)$$

SP: slip rate

Vt: theoretical speed without load (km/h).

Vp: Practical speed with load (km/h).

Fuel consumption :-

It is measured according to the following equation suggested by (Al-Jarrah.1998.)

$$F_q = Q \times 10000 / TL \times W_p \times 1000 \dots(3)$$

Fq:- fuel consumption in the hectare(L /ha)

Q: Quantity of fuel consumption during the transaction (mm/L)

TL: Transaction length (m)

Wp: Width practical (M)

Homogeneity of seed distribution = Number of seeds actually sown / Number of seeds calibration to the machine

Field emergence percentage = (number of seeds sprouted in the experimental unit / number of seeds sown in that unit) x 100.

Results and Discussion

emergence percentage:- %

Table (1) shows the effect of the speed of the tractor and the depth of cultivation on the percentage of emergence, as the increase in the practical speed of the tractor from 2.10 to 3.20, then to 4.50 km / h led to a decrease in the percentage of emergence from 92.05 to 91.8, then to 91.05%, and the depth of 3 cm exceeded

the highest average record The emergence rate was 94.2, while the depth was 5 cm, the average emergence rate was 89.0%, and the overlap between speed was 2.10 km/h and depth was 3 cm. The highest average emergence rate was 94.4%, while the lowest value was achieved in the overlap between speed 4.50 km/h and depth 5 cm, which amounted to 89.0% The reason for the increase in the germination rate may be due to the seedling's ability to grow and erupt in its surroundings, as well as the functional processes that occur during germination at low depths and low speeds, and to the strength and vitality of the seeds. These results are consistent with Mahommmad&Jalal2020.

Table 1
Effect of tractor speed and planting depth and interactions between them on the percentage of emergence of plants %

Middle velocity	Depth (cm)		Velocity Km.hr ⁻¹
	5	3	
92.05	89.7	94.4	2.10
91.8	89.2	94.4	3.20
91.05	88.1	94.0	4.50
1.22	1.72		LSD
	89.0	94.2	Middle depth
	0.99		LSD

Distance between seeds : (cm)

Table (2) shows the effect of the practical speed of the tractor and the depth of planting on the distance between the seeds Increasing the speed of the tractor from 2.10 to 3.20 and then to 4.50 km / h led to an increase in the distance between the seeds from 14.5 to 15.25 and then to 15.55 cm. The depth was 3 cm at the highest distance between the seeds and it was 15.3 cm, while the least distance was at the depth 5 cm and it was 14.9 cm. The bilateral overlap between the speed was 4.50 km/h and the depth was 3 cm, the highest average distance between the seeds was 15.8 cm, while the overlap between the speed was 2.10 km \ hour and the depth is 5 cm, the least distance between the seeds was 14.4 cm. These results agree with (Siddiq&Al-Shiekh2016) .

Table 2
Effect of tractor speed and planting depth and interactions between them on the Distance between seeds (cm)

Middle velocity	Depth (cm)		Velocity Km.hr ⁻¹
	5	3	
14.5	14.4	14.6	2.10
15.25	15.0	15.5	3.20
15.55	15.3	15.8	4.50
0.177	0.102		LSD
	14.9	15.3	Middle depth
	0.125		LSD

Slippage percentage :- %

Table (3) shows the effect of the practical speed of the tractor and the depth of cultivation on the slippage percentage . It is noted that the increase in speed from 2.10 to 3.20, then to 4.50 km/h led to an increase in the slippage percentage from 12.7 to 16.95 and then to 17.50%. The same table shows the effect of depths Agriculture in the slippage percentage , where the depth of 3 cm achieved the lowest value and reached 15.23 which is slightly higher than the average, while the depth achieved 5 cm for slippage percentage and reached 16.2%. The disc, the loosened soil and the weight of the machine that is pulled behind the tractor and not amounted which increases the slippage percentage values. These results agree with Al-Rajbo&Al-sandwoq 2012.

Table 3
Effect of tractor speed and planting depth and interactions between them on the slippage percentage (%)

Middle velocity	Depth (cm)		Velocity Km.hr ⁻¹
	5	3	
12.7	13	12.4	2.10
16.95	17.5	16.4	3.20
17.5	18.1	16.9	4.50
0.27	0.38		LSD
	16.2	15.23	Middle depth
	0.22		LSD

Fuel consumption:- L/ D

Table (4) shows the effect of the practical speed of the tractor and the depth of cultivation on fuel consumption. It is noted that the increase in the speed of the tractor from 2.10 to 3.20 and then to 4.50 km / h led to a decrease in the values of fuel consumption from 1.15 to 0.73 and then to 0.50 liters / acres. The reason may be due to This led to a decrease in the time required to complete the work by increasing the speed of the tractor, and then it led to a decrease in fuel consumption, and the depth of 3 cm achieved the lowest value and amounted to 0.76 liters / dunum, while the depth of 5 cm achieved the highest value of fuel consumption, which amounted to 0.83 liters / dunum. The reason for this may be due to the actual load increase The tractor was forced to increase the depth of cultivation, which led to an increase in the values of fuel consumption at the great depth. These results are consistent with (Al-Jubourie et al. 2012).

Table 4
Effect of tractor speed and planting depth and interactions between them on the Fuel consumption (L / D)

Middle velocity	Depth (cm)		Velocity Km.hr ⁻¹
	5	3	
1.15	1.2	1.1	2.10
0.73	0.77	0.70	3.20
0.50	0.52	0.48	4.50
0.059	0.084		LSD
	0.83	0.76	Middle depth
	0.048		LSD

Conclusions and Recommendations

- Use the appropriate speed in order to reduce the percentage of slipping and drop the seeds in place suitable for exploitation the largest area .
- Choosing the appropriate depth for the crop to obtain good emergence percentage
- Good tillage with high leveling gives better planter performance by reducing vibrations while working it gives very good results.
- While working, it gives very good results
- Appropriate arrangements for the maintenance of the planter so as not to affect its performance.

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