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The cylinder speeds and clearance sieves on evaluating the performance of the New Holland combine harvester

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Abstract
Aims of this research was to reducing Losses in wheat crop which is considered essential criterion for evaluating the performance of the grain harvester. Cylinder speeds, clearance sieves on evaluating the performance of the new Holland combine harvester. Broken seeds, material other than grain (MOG) and grains behind the combine were studied in this research. The treatment included threshing cylinder speeds (7.00, 8.00, 9.00 rpm), and clearance of sieves with three levels (7, 9, 11) mm. The Spilt plot design with three replications was used in the research. Results showed that the cylinder speed 7.00 rpm gets the les broken seeds which amounted 2.02% and les grains behind combine (3.48) kg. donm^{-1}, the cylinder speed 900 rpm gets the les MOG 0.76% and the clearance sieves 7 mmm gets les broken seeds (2.71%), clearance sieves 11 mm gets les MOG amounted 0.70% and the grains behind combine which amounted (2.74) kg.daom^{-1}.

Keywords: Broken seeds, material other than grain, clearance sieves, threshing cylinder

Introduction
There are several types of crop losses during harvesting that occurs in all parts of the grain harvester and its units, which effected the economic return and a big loss in the productivity (Al-Banna, 1998) [1]. Including losses in the cutting unit from broken grains due to the higher velocity of the cylinder, the height of the cutter bar, or the wrong entry of the reel or its high speed (Petar, 2016) [15]. Losses grains falling on the ground behind the combine harvester are one of the most important types of loss, which is caused by the speed of the fan, the small clearance between the sieve, or the correct adjustment of the grain transport auger (Al-Rajaboo, 2012) [12]. Effect of threshing time on losses of wheat grain was invested by (Agha *et al*., 2004) [16]. The conditions of the wheat crop field, the condition of the crop, and the organization of other units in the New Holland combine play a major role in reducing the (MOG) entering the grain tank (Muhammad *et al*., 2012) [17], in addition to the direction of the air stream on the sieves and determining the appropriate sizes of the sieves openings. (Kehayov *et al*., 2004) [4]. Majority of loss occur during harvesting. Timely processes, Due to knocking on the grains inside the threshing unit because lack of cushion needed to absorb shocks (Ashgari *et al*., 2008) [6]. The loss includes the grain transported with the threshing unit to the straw walker and its falling backwards to the ground due to the inefficiency of the thresher unit in separating these materials from the straw and directing them towards the grains pin. (Ahmad *et al*., 2013) [14]. Threshing and cleaning units has very important in separation the wheat grain from heads due to the clearance between sieves and cylinder concave (Taha, 2017) [18]. The broken grain increased significantly as the cylinder speed increased from 450to 850 rpm. Highest value of broken grains was obtained at lower moister content, The most broken grain of 0.67% was amounted at cylinder speed of 850 rpm (Alzadeh *et al*., 2010) [8]. according (Hamzah and Al-Sharifi, 2020) [3] Delay in the harvest time of the wheat crop leads to large losses in the grains due to maturity, which leads to the loss of grains and their separation from the ears. Choosing the appropriate threshing cylinder speed and the clearance between the sieves is significantly linked to increasing wheat crop productivity and reducing grain loss during harvest using the New Holland combine (Alsharifi *et al*. 2017) [2]. found (Davoodi and Haushyar, 2010) [7] decrease in threshing cylinder peed from 750 to 850 rpm due to decrease broken seeds of wheat from 3.16% to 1.96% and decrease cleaning unit losses from 5.45% to 3.67%., the grain losses behind the straw walker and cleaning unit were higher than 1%. New Holland harvester throughput at the level 9.5 kg/s can be considered as an optimal value for the harvest of the wheat crop

with higher moisture content. (Spokase *et al*., 2016) [5].

Materials and Methods

The experiment was conducted on the fields of the AL-Dawaya city \ Dhi Qar, Iraq in season in sandy soil 2023. Results were statistically analyzed and Last significant differences were method at probability level (0.05) spilt plot design. With Three replication. The main plot included the threshing cylinder speeds: 700, 800 and 900 rpm the second factor the clearance sieves has three levels: 7, 9 and 11 mm using the New Holland combine harvester.

Studied indicator

Cylinder loss % = (Threshed grain collected from shaker, g / Gross yield, g)*100 (Patel 2013) [23]

Sieves loss% = (Threshed grain collected from sieves, g / Gross yield, g)*100

Technical Specification of New Holland Harvester

Model	TC 549-2013
Weight	7500 m kg
Grain tank capacity	3000 kg
Rated power	246 hp
Maximum power	97 kw
Number of cylinder (engine)	6
Cutting Unit Width	4 m
Threshing unit Width	1.3 m
Number straw walker	4

Results and Discussion

Broken seeds %

Table (1) shows the effect of the threshing cylinder speed, clearance sieves, in the broken seeds. Increasing the cylinder speeds from 700 to 800 and then to 9.00 rpm caused an increase proken seeds from 2.02 to 3.01 and then to 4.84% This is because when the cylinder speed increased, it scrub the grains wheat and increase strikes on stalks this is consistent with the results reached Davoodi and Houshyar (2010) [7]. While the lowest value was achieved in the overlap between cylinder speed 700 rpm and clearance sieves 7 mm which amounted to 1.60%.

Table (1) shows the effect of the clearance sieves on broken seeds, as it is noted that the increase clearance sieves from 7 to 9 and then 11 mm caused increase broken seeds from 2.71 to 3.50 and then 3.67%.

Table 1: Effect of cylinder speed, clearance sieves in broken seeds %

Average threshing cylinder speed	Clearance sieves (mm)			Threshing cylinder speed Rpm
	11	9	7a	
2.02	2.33	2.13	1.60	700
3.01	3.17	3.30	2.57	800
4.84	5.50	5.07	3.97	900
0.48	N.S			LSD
	3.67	3.50	2.71	Average clearance sieves
	0.79			LSD

Materials other than grain (MOG) %

Table (2) shows the effect of the threshing cylinder speed, clearance sieves, in the materal other than grain MOG. Increasing the cylinder speeds from 700 to 800 and then to 9.00 rpm caused an decrease MOG from 1.56 to 1.01 and then to 0.76% This is because when the increased cylinder speeds due to thresher seeds and push MOG to the back deraction to cleaning unit, this is consistent with the results reached Al- Rajaboo (2012) [12]. Table (2) shows the effect of the clearance sieves on material other than grain, as it is noted that the increase clearance sieves from 7 to 9 and then 11 mm caused decrease material other than grain from 1.41 to 1.21 and then 0.70%. While the lowest value was achieved in the overlap between cylinder speed 900 rpm and clearance sieves 11mm which amounted to 0.47%.

Table 2: Effect of cylinder speed, clearance sieves in material other than grain MOG %

Average threshing cylinder speed	Clearance sieves (mm)			Threshing cylinder speed Rpm
	11	9	7	
1.56	0.97	1.87	1.83	700
1.01	0.67	1.10	1.27	800
0.76	0.47	0.67	1.13	900
0.49	N.S			LSD
	0.70	1.21	1.41	Average clearance sieves

Grains behind harvester kg / DONM

Table (3) shows the effect of the threshing cylinder speed, clearance sieves, in the grains wheat behined combine harvester. Increasing the cylinder speeds from 700 to 800 and then to 9.00 rpm caused an increase grain behined harvester from 3.48 to 3.77 and then to 4.41 kg / DONM. This is because when the increased speeds due to for separating thresher seeds from stalks wheat, this is consistent with the results reached (Spokas *et al*., 2016) [5] Table (3) shows the effect of the clearance sieves on grains behined harvester, as it is noted that the increase clearance sieves from 7 to 9 and then 11 mm caused decrease grains

behined harvester from 5.61 to 3.30 and then 2.74%. While the lowest value was achieved in the overlap between cylinder speed 700 rpm and clearance sieves 11 mm which amounted to 2.07%.

Table 3: Effect of cylinder speed, clearance sieves in grains behined harvester kg / DONM

Average threshing cylinder speed	Clearance sieves (mm)			Threshing cylinder speed rpm
	11	9	7	
3.48	2.07	3.13	5.23	700
3.77	2.80	2.80	5.70	800
4.41	3.37	3.97	5.90	900
N.S	N.S			LSD
	2.74	3.30	5.61	Average clearance sieves

Conclusion and Recommendations

Broken seeds has been gets in threshing cylinder speed 700 rpm amounted to 2.02%, and in the clearance sieves 7 mm amounted to 2.71%, and the lowest material other than grain was 0.76%, while the speed of the thrashing cylinder speed 900 rpm, clearance sieves 11mm gets the lowest percentage of material other than grain which amounted to 0. 70%, the grains behind harvester was 4.41 kg. $Donm^{-1}$ in the cylinder speed 900 rpm, while the clearance sieves 11 mm was 2.74 mm. We recommend using a New Holland combine with a cylinder speed of 700 rpm and clearance sieve of 11 mm because it gives the best results.

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