Study effect moisture content of grain and speed in some indicators technical to milling machines.

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Abstract:

Experiment was conducted to evaluate effect moisture content of grain and speed in some indicators technical to wheat cultivar, Ahwaz 1 in the labrotaries of the University of Tehran to2015. Research include using two types of machines (Cylinder and Hammer), under three levels from moisture conten of grain (13-15% , 15- 17% and 17-19%),and three levels from speed (0.717 , 0.820 and 0.921) . The results indicated that the machine type Cylinder was significantly better on the machine type Hammer in all studies traits. As well as moisture grain 13-15% was superiorly significantly on two levels 15-17%,17-19% in all studied traits . While speed 0.921 significant superiorly on two levels 0.717,0.820 in all studies traits except the percentage of breakage grain which gives result best with the speed level o.717 . The overlap between the machine type Cylinder and grain moisture content 13-15% superiority significantly and also overlap between the machine type Cylinder to speed 0.921 in all studied traits except the percentage of breakage grain . Compared overlap to the machine type Hammer with moisture content of grain and two speed in all studied traits. The best results have come from the triple overlap among machine type Cylinder, grain moisture (13-15%), and speed 0.921 in all studies tirats except percentage of breakage grain which gives the best result with overlap 0.717 to moisture content of grain 13-15% and machine type Cylinder .
Key worde:Production Process, Power Consumeption, Milling Recovery, Degree of Milling, Percentage of Breakage of grain , Milling Efficiency.

Introduction:

Wheat is considered as the first and the most important crops in the world in so for the economic aspects are concerned and for the great proportion of population all over the world because it provides for about 55 %from the total carbohydrates and 20 % from the total calorie food. (Pasikatan et al 2001) Within this chapter are presented the flow diagrams for two wheat mills of different capacities, one of 100 tons / 24 hours and one of 220 tons / 24 hours, from which it can be estimated the movement of products within the mill.(Voicu et al 2011) There are also presented the experimental results obtained from the particles size distribution of the material subjected to grinding and of the resulted grist, in both technological phases, for the two mills, as well as particles size distribution of the material for various grinding machines of the analyzed mills.Knowing of the mechanical characteristics of wheat seeds and of the grist particles, and also their size characteristics, volume and mass of the wheat seeds, is useful for estimating the energy required for crushing.(Greffeuille et al 2005) Tend to give broken particles of more uniform size and composition. (However,despite these differences in the initial breakage patterns that would appear to favour soft wheats for clean bran separation, the bran from hard wheats is in fact easier to ‘‘clean up’’ subsequently . Also, flour stocks from hard wheats flow and sift more easily,so that hard wheats are generally easier to process into flour than soft wheats. Other workers have also studied particle breakage during roller milling of wheat. (Abu Al khair et al,2005) reported that the organizing machine has a direct effect on the productivity of the machine the more the organization is set whenever the high productivity because of the low percentage of break-up and this is reflected positively on the increase machine productivity due to increased efficiency of the existing work .(Ahmed 2007) Concluded that the productivity of machine

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crunches affected by grain type and the type of machine and process speed.(Aljiboury 2010)Said that importing great quantities of wheat from other countries might expose the Iraqi economic to the risks of high prices changing, especially during the stages of harvest where great quantities of wheat are lost because of the unregulated harvest machines. In this research, we are going to study two types of roller mechanical mill and hammer milling relation with the speed and moisture content in some mechanical and qualitative characteristics on two types of wheat. (Barros et al 2010)kernels and of flour stocks, giving results that are generally consistent with those presented above and giving additional insights into effects on particle composition as well as size following breakage. Cleve and Will investigated effects of roll gap and corrugation (flute profile) on breakage, concluding that the corrugation profile of First Break was more important than of subsequent breaks. Hsieh et al.studied the effects of conditioning moisture, feed rate, roll gap, differential and roll speed on First Break milling. (Yuan et al. 2003) presented a unit operations-based analysis of the break subsystems in a pilot-scale flour mill. They highlighted the need for models of particle breakage throughout the milling process and the benefits of incorporating such models into computer simulations to aid mill control and optimisation as well as the training of millers. (Al-Mogahwiet al 2005) Investigated breakage in both break and reduction roll systems in a commercial mill and suggested some alternative approaches for characterising the particle size distribution relationships of flour stocks from these operations. Their approaches might allow simpler forms of the breakage function to be developed, as well as facilitating extension of the breakage equation approach developed here for First Break to the rest of the milling process.(Pujol et al. 2000) Bescribed a micromill designed to measure accurately the mechanical energy consumption during milling of small quantities of wheat. Specific Roller Milling of Wheat 419 milling energy under the conditions of their study ranged from 13.2 kJ/kg for a soft wheat to 19.6 kJ/kg for a hard wheat, and correlated well with NIR hardness. This work underlines the importance of including the energy consumption in models of wheat breakage during roller milling and relating this to the particle size distribution produced.(AACC International, 2012),Baking quality of control flours and flours treated to contain 1% NaCl (14% moisture basis) were determined after 0, 12, and 24 weeks of storage using approved method 10-13.02 .(Mazlina et al 2006)In gristing passages, milling rollers with fluted surface are used, and in milling passages, rollers with smooth surface are used. The quality of wheat milling process Food Industry .is influenced by the physical and mechanical properties of seeds and of the intermediate products (size distribution, seeds hardness, moisture content) and by the design and functional parameters.(Campbell 2007)of the roller mill (mutual arrangement of the rollers, differential speed, distance between the rollers, flutes profile, mutual position of the flutes), .Effects of these factors are manifested in the size distribution of material particles, compositional distribution of the material, wear degree of the rollers, energy consumed for grinding,(Posner et al 2005) Wheat kernel physical characteristics, such as uniformity in kernel hardness and size, are important for milling traditional wheat flour because they maximize separation of the bran from the endosperm during roller milling . These parameters may not be important for milling whole wheat flour, since separation of kernel components is not the goal.(Bruckner et al. (2001) analyzed mixograph and baking properties in 11 winter and 12 spring wheat varieties grown in four locations using both wheat flour and whole grain flour. They found that, while correlations between flour and whole flour for many variables were significant, correlation coefficients varied widely. For instance, water absorption and loaf volume correlation coefficients ranged from 0.17 to 0.81 and from 0.08 to 0.72, respectively, depending on variety and crop year. Clearly the outer portions of the wheat kernel exert physical and chemical effects on dough properties that vary among different types of wheat. (Kihlberg et al., 2004). The two predominant techniques for grinding whole grain flours are stone and roller mills. Whole grain flours could also notionally be produced with an impact or hammer mill.

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(Kent and Evers, 1994). First, conditioning (tempering) is less important when milling whole wheat flour. While wheat flour relies on proper conditioning to facilitate endosperm and bran separation, this is not required for whole wheat milling. Thus, in theory no conditioning should be required, although many mills will add 1-2% moisture to soften the grain and improve efficiency in terms of the energy required to produce the flour. Efficiency can also be improved by tightening the roll gap and using more open scalp covers to increase the break release, as well as changing some of the smooth rolls to corrugated during reduction. The purifier air valves should also be adjusted so that the bran and germ are not rejected but are returned to the reduction system.(Fang et al 2000) Differential speed of milling rollers has a significant effect on the grinding of semolina, flour and wheat bran. With the increase of differential speed of rollers, it also increases the amount of semolina and decreases the amount of flour and wheat bran. This is due to the difference between shearing and compression forces which are applied on the particles. It is very important to know the size distribution of the material subjected to grinding, as well of the gris.

Material and methods

Experiment was carried out in the laboratory of university of Tehran to season 2014-2015 used in the experimen two types mills machines (Cylinder and Hammer) The main factors ,under three levels of moisture content of grain 13-15% , 15-17% and 17-19%.The secondary factors And three levels of speed 0.717, 0.820 and 0.921 $M_{r=\frac{W_M}{W_t}\times 100}$.under secondary factors, random semples were taken wheat cultivar (Ahwaz 1) by probe and collected on form of heaps ,Number heaps six each heap weight 160kg, according of method used from by (Alshrifi et al 2007).Wheat was cleaned to remove all foreign matters, broken and immature grains using sieves.Then the random samples taken from per heaps weight 1000gm .The initial moisture content of wheat grain was determined by the methods of oven drying at 103C for 48h according of method used from by (Andres et al 2012). To obtain the desired moisture content level wheat was kept in an oven at temperature of 43C and monitored carefully for Ahwaz 1 cultivar . when determining moisture content of grain 17-19% then sample taken and place in Precision divider to get a sample of weight 200gm ,the samples were carefully sealed in polythene bags. Then organization of the machine of the type cylinder on clearance 0.8mm and speed 0.921 . this sample which weight 200g is placed in the machine of the type cylinder . After taking out the sample of the machine is placed in cylindrical insulation device from Satake type operating time of adjust for 2 minut and the angle of inclination 25 degree insolate the broken and full of grain of all size.The following indicators were calculated

1- Production process : Eq 1(Al sherifi 2007)

$$P = \frac{W \times 60}{T \times 1000} \quad (1)$$

Where:
P- Production process ton/ hr.
W- Output wieght. kg.
T- time hr.

2- Power Consumeption: Eq2(Chaitep 1998)

$$P = \frac{\sqrt{3}}{1000} \cdot v \cdot I \cdot \cos\varphi \cdot E_{FE} \quad (2)$$

Where:
P – Power consumed. kw
V – Voltage.
I- The current Am
$cos\ \varphi$-Angle detween the current and voltage.
E_{FE} - The efficiency of the motor %.

3-Milling Recovery: Eq 3(Alsaidi 1983)

(3)

Where:
-M_r-Is the Milling process. %
- W_M-Is the weight of milling paddy. g.
-W_s-Is the weight of sample used . g.

4- Degree of Milling: Eq 4 (Al sherifi 2007)

$$D_{M=\frac{W_{MR}}{W_{bR}}\times 100}$$

Where:

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D_M – Milling Degree
W_{MR} -Weight of Milling Paddy . g
W_{bR} - Weight of brawn Paddy .g

5-Breakage proportion: Eq 5 (Chaitep 1998)

$$P_B = \frac{W_{Br}}{W_s} \times 100$$

(5)

P_B-Is the proportion of wheat %.
W_{Br} -Is the weight of breakage grain before maunfacturing stage . g
W_s -is the weight of wheat sample used g.

6-Efficiency mechanical : Eq 6 (Al sherifi 2007)

$$E_M = \frac{P_N - P_W}{P_N} \times 100$$

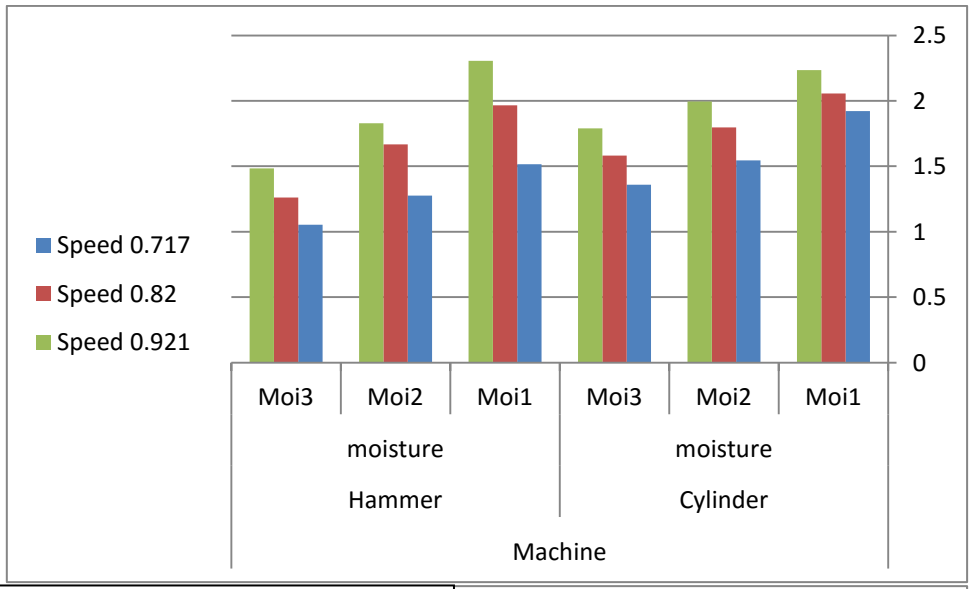
(6)

Where:

E_M -Is efficiency mechanical.
P_N -Is productivity theory. g
P_W -Is productivity work . g

Then repeat of the same method and measurements of the previous using of the machine type Satake ,moisture content of grain 15-17%, 17-19% and speed 0.717,0.820 and three replication.To Wheat clutivar (Ahwaz 1) . Then repeat the work steps same and all accounts using of the machine type Hammer .each moisture content of grain and each speed to same cultivra . Results were analyzed statistically using the design C R Dand tested the difference among treatment each factor according tothe test LSD less significant difference 0.05.(Oehlent 2010) .

Results and Disussion:



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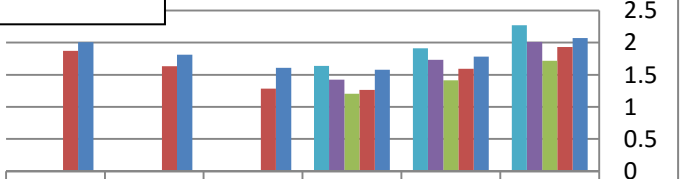
Moisture*Speed = 0.166

The interaction



	0.921	0.82	0.717	Moi3	Moi2	Moi1
	Speed			Moisture		
Machines Cylinder	2.006	1.811	1.609	1.577	1.779	2.071
Machines Hammer	1.873	1.631	1.282	1.266	1.59	1.929
Machines 0.717				1.206	1.411	1.719
Machines 0.82				1.421	1.732	2.011
Machines 0.921				1.637	1.912	2.27

Fig (1) IIlustartes effect type machines , Speed and Grain moisture in the Production Process Ton\hr .

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Figuer 1 shows the influence of the type of machine,clearance ,grain moistuer in the Production Process ton\hr.The results indicated that the machine type Cylinder was significantly better than the machine type Hammer, by an increased of (13.4)%. Because efficiency and type machine, when used the machine type Cylinder , compared the machine type Hammer.These findings consistent with the findings of (Pasikatan et al 2001) .Increasing the speed led to asignificant increase extrusive ,If excelled 0.717 on 0.820 and 0.921 by an increase of (19.0 and 12.7)%. respectively .This is due to increased production with increased the speed .These results are consistent with the results that gained by (Voicu et al 2011). decreasing grain moisture led to a significant increase and form extrusive . If excelled percentage moistuer content of grain 13-15% it led to a significant increase, by an inecrease of (18.6 and 18.4)% respectively . Compared with the grain moisture 15-17% and 17-19%. This is due to increased moisture of grain led to hamper milling process,hence decreased production process.These results are consistent with the results that gained by (Alshrifi et al 2007).The overlap between the grain moisture and speed was significantly . While the superiority of overlap between the grain moisture 13-15% and speed 0.921 on overlap between the grain moisture 17-19% to speed 0.717 ,by an increase of (88.2)%.Also the overlap between the machine type speed was significant too because significant better, the overlap between the machine type Cylinder and the speed 0.921 comparing with the machine type Hammer to the speed 0.717 .By an increase of (56.4)%. While the overlap between the machine type and grain moisture was significantly .The highest production process, when the overlap between the type machine Cylinder and the grain moisture 13-15% comparing with the machine type Hammer to the grain moistuer 17-19% ,by an increase of (63.5)%. The best high rate (118.9)% have come from the triple overlap among type Cylinder ,grain moisture 13-15% and speed 0.921.

Figuer 2 shows the influence of the type of machine,clearance ,grain moistuer in the Power Consumeption kw.The results indicated that the machine type Cylinder was significantly better than the machine type Hammer, by an decreased of (4.6)%. Because efficiency and type machine, when used the machine type Cylinder , compared the machine type Hammer.These findings consistent with the findings of (Pujol et al. 2000) .Increasing the speed led to asignificant increase extrusive ,If excelled 0.717 on 0.820 and 0.921 by an decrease of (6.3 and 5.6)%. respectively .This is due to decreased power consumeption with increased the speed .These results are consistent with the results that gained by (Ahmed 2007). Increasing grain moisture led to a significant increase and form extrusive . If excelled percentage moistuer content of grain 13-15% it led to a significant decrease, by an decrease of (5.0 and 6.7)% respectively . Compared with the grain moisture 15-17% and 17-19%. This is due to increased moisture of grain led to hamper milling process,hence increased power consumeption.These results are consistent with the results that gained by (Chaitep 1998).The overlap between the grain moisture and speed was significantly . While the superiority of overlap between the grain moisture 13-15% and speed 0.921 on overlap between the grain moisture 17-19% to speed 0.717 ,by an decrease of (23.6)%.Also the overlap between the machine type speed was significant too because significant better, the overlap between the machine type Cylinder and the speed 0.921 comparing with the machine type Hammer to the speed 0.717 .By an decrease of (17.8)%. While the overlap between the machine type and grain moisture was significantly .The highest production process, when the overlap between the type machine Cylinder and the grain moisture 13-15% comparing with the machine type Hammer to the grain moistuer 17-19% ,by an decrease of (17.1)%. The best high rate (30.2)% have come from the triple overlap among type Cylinder ,grain moisture 13-15% and speed 0.921.

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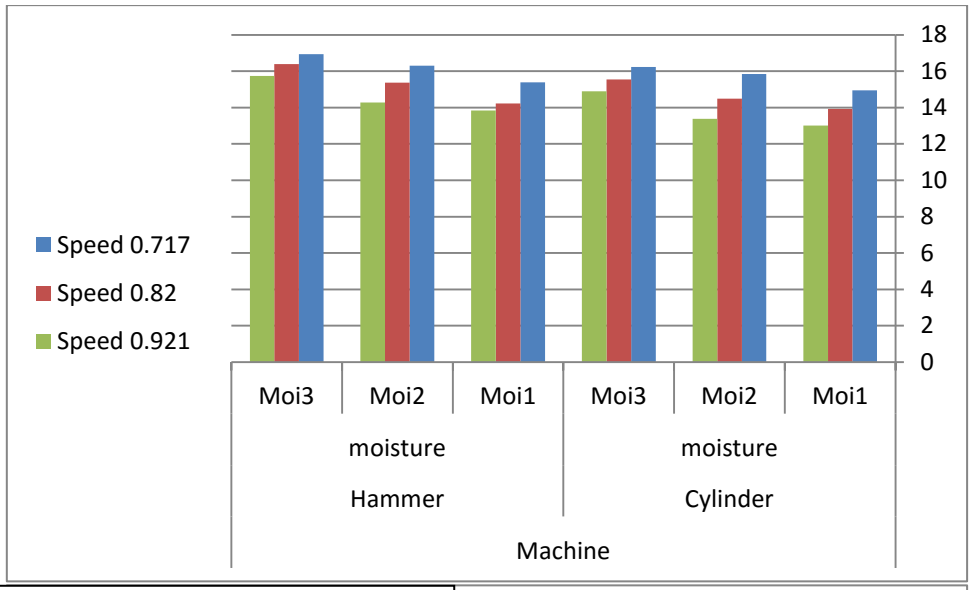

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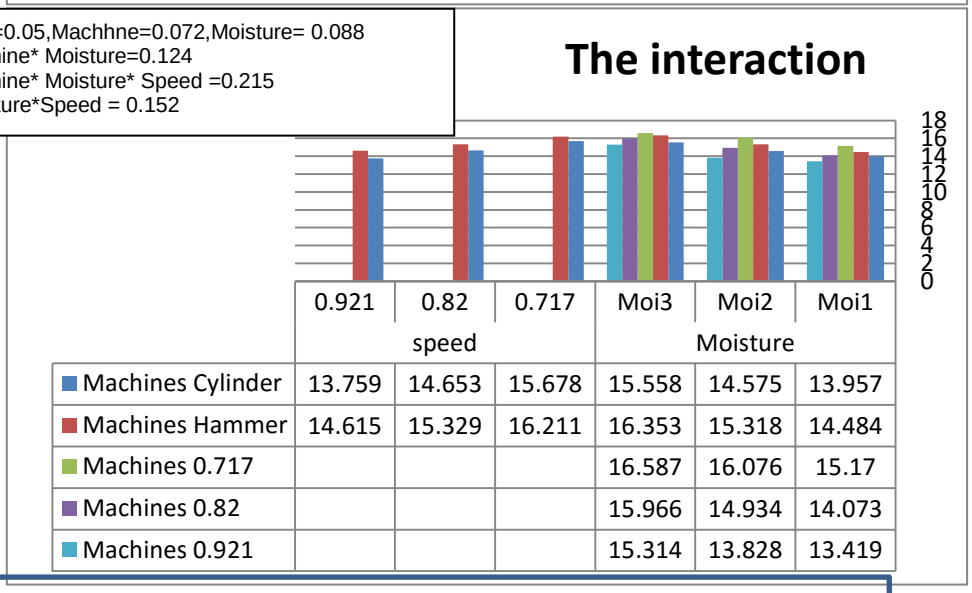
Moisture*Speed = 0.152



	0.921	0.82	0.717	Moi3	Moi2	Moi1
	speed			Moisture		
Machines Cylinder	13.759	14.653	15.678	15.558	14.575	13.957
Machines Hammer	14.615	15.329	16.211	16.353	15.318	14.484
Machines 0.717				16.587	16.076	15.17
Machines 0.82				15.966	14.934	14.073
Machines 0.921				15.314	13.828	13.419

Fig (2) IIIustartes effect type machines , Speed and Grain moisture in the Power Consumeption kw.

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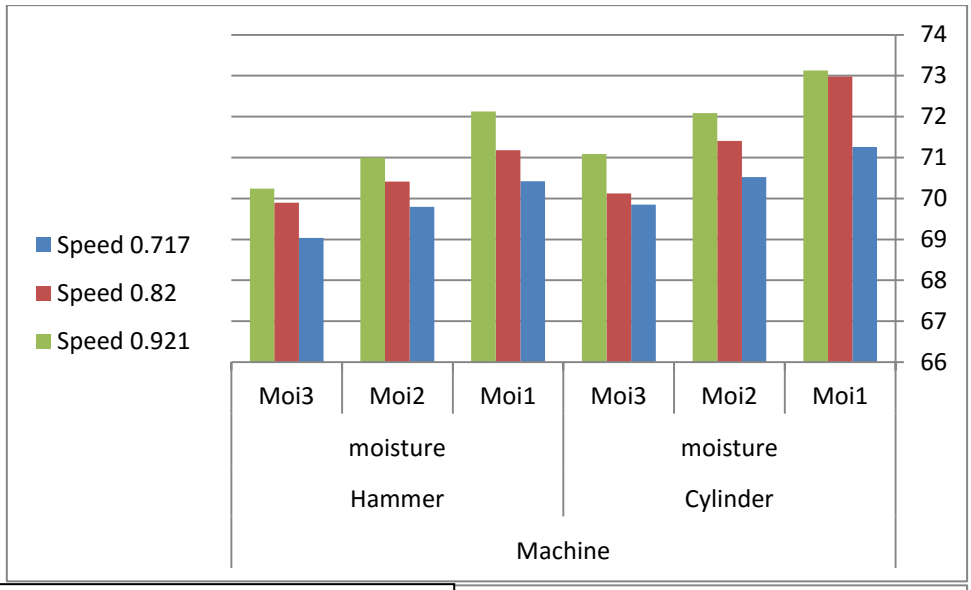

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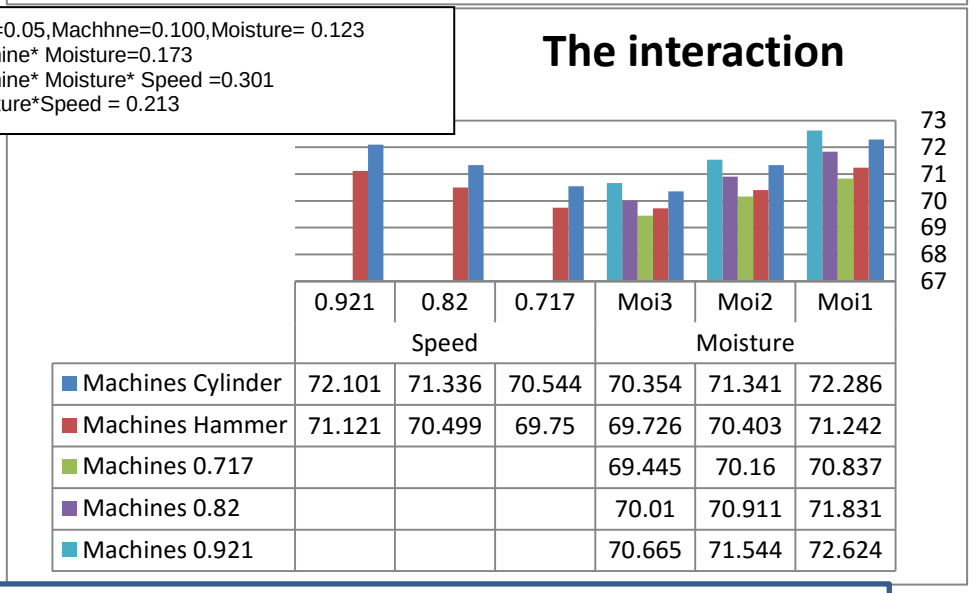
Machine* Moisture* Speed =0.301
Moisture*Speed = 0.213



	Speed 0.921	Speed 0.82	Speed 0.717	Moisture Moi3	Moisture Moi2	Moisture Moi1
Machines Cylinder	72.101	71.336	70.544	70.354	71.341	72.286
Machines Hammer	71.121	70.499	69.75	69.726	70.403	71.242
Machines 0.717				69.445	70.16	70.837
Machines 0.82				70.01	70.911	71.831
Machines 0.921				70.665	71.544	72.624

Fig (3) IIIustartes effect type machines , Speed and Grain moisture in the Milling Recovery %.

Figuer 3 shows the influence of the type of machine,clearance ,grain moistuer in the Milling Recovery % .The results indicated that the machine type Cylinder was significantly better than the machine type Hammer, by an increased of (1.2)%. Because efficiency and type machine, when used the machine type Cylinder , compared the machine type Hammer.These findings consistent with the findings of (Aljiboury 2010) .Increasing the speed led to asignificant increase extrusive ,If excelled 0.717 on 0.820 and 0.921 by an increase of (1.0 and 0.9)%. respectively .This is due to increased milling recovery with increased the speed .These results are consistent with the results that gained by (Alsaidi 1983). decreasing grain moisture led to a significant increase and form extrusive . If excelled percentage moistuer content of grain 13-15% it led to a significant increase, by an increase of (1.3 and 1.1)% respectively . Compared with the grain moisture 15-17% and 17-19%. This is due to increased moisture of grain led to hamper milling process,hence increased milling recovery when used machine type Cylinder.These results are consistent with the results that gained by (AACC International, 2012),.The overlap between the grain moisture and speed was significantly . While the superiority of overlap between the grain

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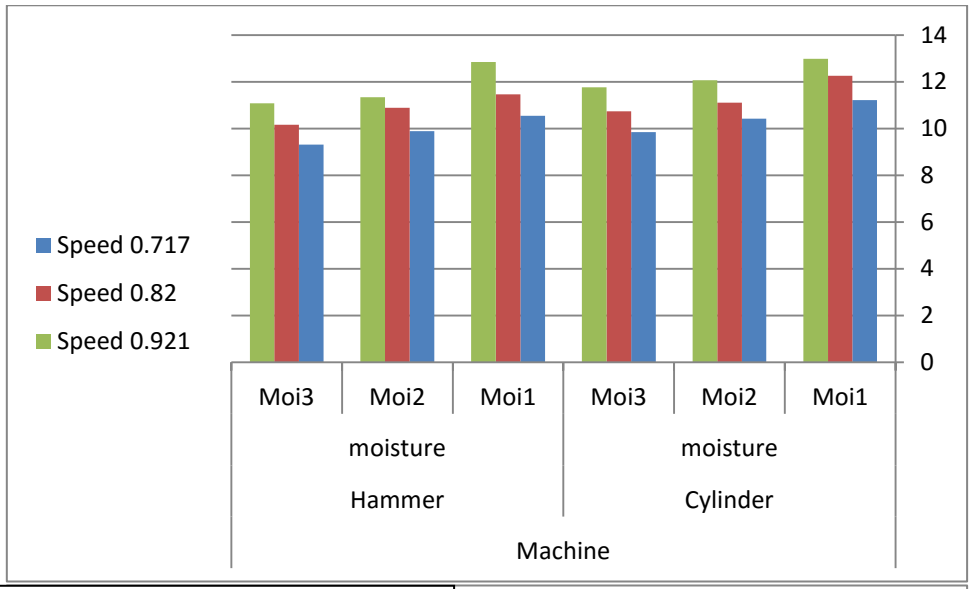
moisture 13-15% and speed 0.921 on overlap between the grain moisture 17-19% to speed 0.717 ,by an increase of (4.5)%.Also the overlap between the machine type speed was significant too because significant better, the overlap between the machine type Cylinder and the speed 0.921 comparing with the machine type Hammer to the speed 0.717 .By an increase of (3.3)%. While the overlap between the machine type and grain moisture was significantly .The highest production process, when the overlap between the type machine Cylinder and the grain moisture 13-15% comparing with the machine type Hammer to the grain moistuer 17-19% ,by an increase of (3.6)%. The best high rate (5.9)% have come from the triple overlap among type Cylinder ,grain moisture 13-15% and speed 0.921.



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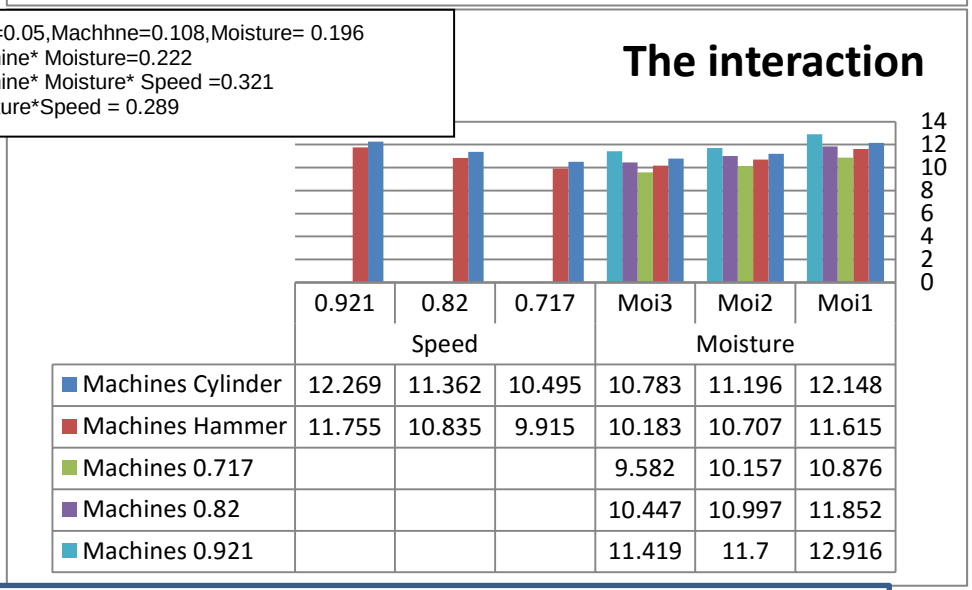
Moisture*Speed = 0.289



	0.921	0.82	0.717	Moi3	Moi2	Moi1
	Speed			Moisture		
Machines Cylinder	12.269	11.362	10.495	10.783	11.196	12.148
Machines Hammer	11.755	10.835	9.915	10.183	10.707	11.615
Machines 0.717				9.582	10.157	10.876
Machines 0.82				10.447	10.997	11.852
Machines 0.921				11.419	11.7	12.916

Fig (4) IIIustartes effect type machines , Speed and Grain moisture in the Degree of Milling %.

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Figuer 4 shows the influence of the type of machine,clearance ,grain moistuer in the Degree of Milling % .The results indicated that the machine type Cylinder was significantly better than the machine type Hammer, by an increased of (4.9)%. Because efficiency and type machine, when used the machine type Cylinder , compared the machine type Hammer.These findings consistent with the findings of (Al sherifi 2007) .Increasing the speed led to asignificant increase extrusive ,If excelled 0.717 on 0.820 and 0.921 by an increase of (8.7 and 8.2)%. respectively .This is due to increased milling recovery with increased the speed .These results are consistent with the results that gained by (Fang et al 2000). decreasing grain moisture led to a significant increase and form extrusive . If excelled percentage moistuer content of grain 13-15% it led to a significant increase, by an increase of (8.4 and 4.4)% respectively . Compared with the grain moisture 15-17% and 17-19%. This is due to increased moisture of grain led to hamper milling process,hence increased milling recovery when used machine type Cylinder.These results are consistent with the results that gained by (AACC International, 2012).The overlap between the grain moisture and speed was significantly . While the superiority of overlap between the grain moisture 13-15% and speed 0.921 on overlap between the grain moisture 17-19% to speed 0.717 ,by an increase of (34.7)%.Also the overlap between the machine type speed was significant too because significant better, the overlap between the machine type Cylinder and the speed 0.921 comparing with the machine type Hammer to the speed 0.717 .By an increase of (23.7)%. While the overlap between the machine type and grain moisture was significantly .The highest production process, when the overlap between the type machine Cylinder and the grain moisture 13-15% comparing with the machine type Hammer to the grain moistuer 17-19% ,by an increase of (19.2)%. The best high rate (39.3)% have come from the triple overlap among type Cylinder ,grain moisture 13-15% and speed 0.921.

Figuer 5 shows the influence of the type of machine,clearance ,grain moistuer in the Percentage of Breakage Grain % .The results indicated that the machine type Cylinder was significantly better than the machine type Hammer, by an decreased of (13.8)%. This is due to ease the flow of grain , when used the machine type Cylinder , compared the machine type Hammer.These findings consistent with the findings of (Al sherifi 2007) .Increasing the speed led to asignificant increase extrusive ,If excelled 0.717 on 0.820 and 0.921 by an increase of (21.9 and 12.7)%. respectively .This is due to increased shows of grain to break-up with increased the speed .These results are consistent with the results that gained by (Yuan et al. 2003). increasing grain moisture led to a significant increase and form extrusive . If excelled percentage moistuer content of grain 13-15% it led to a significant decrease, by an decrease of (41.3 and 27.6)% respectively . Compared with the grain moisture 15-17% and 17-19%. This is due to increased moisture of grain led to grain loss of resistance to pressures meted out when move inside planthamper milling process,hence increased percentage of breakage grain.These results are consistent with the results that gained by (Barros et al 2010).The overlap between the grain moisture and speed was significantly . While the superiority of overlap between the grain moisture 13-15% and speed 0.717 on overlap between the grain moisture 17-19% to speed 0.921 ,by an decrease of (135.7)%.Also the overlap between the machine type speed was significant too because significant better, the overlap between the machine type Cylinder and the speed 0.717 comparing with the machine type Hammer to the speed 0.921 .By an decrease of (66.1)%. While the overlap between the machine type and grain moisture was significantly .The lowest percentage of breakage grain , when the overlap between the type machine Cylinder and the grain moisture 13-15% comparing with the machine type Hammer to the grain moistuer 17-19% ,by an decrease of (105.3)%. The best high rate (189.6)% have come from the triple overlap among type Cylinder ,grain moisture 13-15% and speed 0.717

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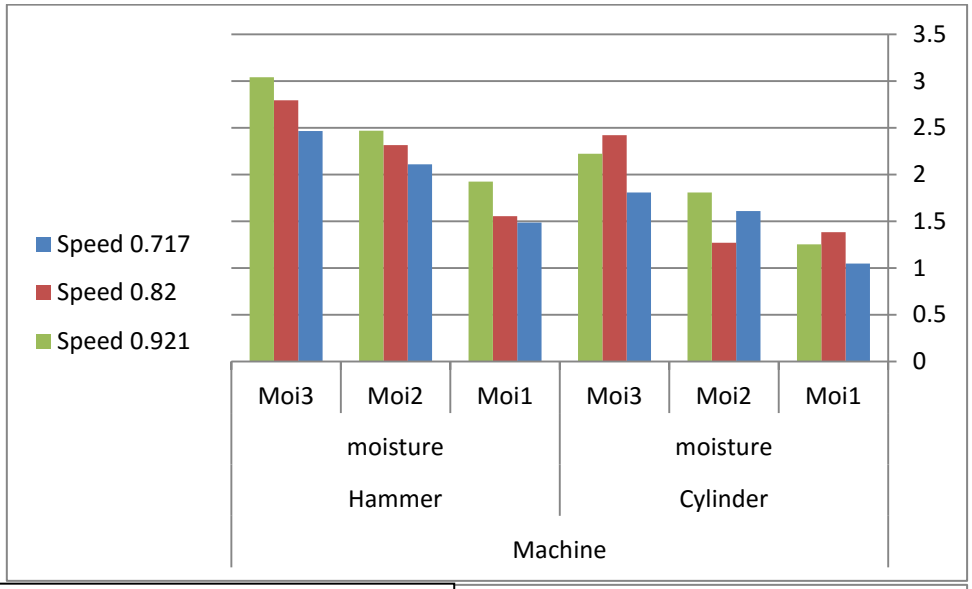

LSD=0.05,Machhne=0.034,Moisture= 0.041
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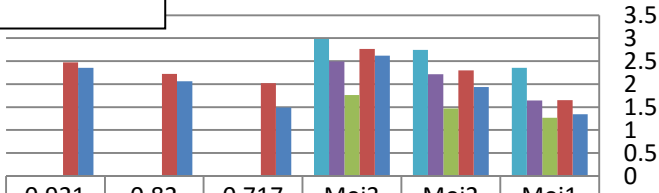
Machine* Moisture* Speed =0.074
Moisture*Speed = 0.052

The interaction



	0.921	0.82	0.717	Moi3	Moi2	Moi1
	Speed			Moisture		
Machines Clinder	2.352	2.06	1.49	2.619	1.936	1.347
Machines Hammer	2.476	2.221	2.02	2.766	2.297	1.653
Machines 0.717				1.765	1.469	1.266
Machines 0.82				2.493	2.212	1.646
Machines 0.921				2.984	2.742	2.352

Fig (5) IIIustartes effect type machines , Speed and Grain moisture in the Breakage Proportion %.

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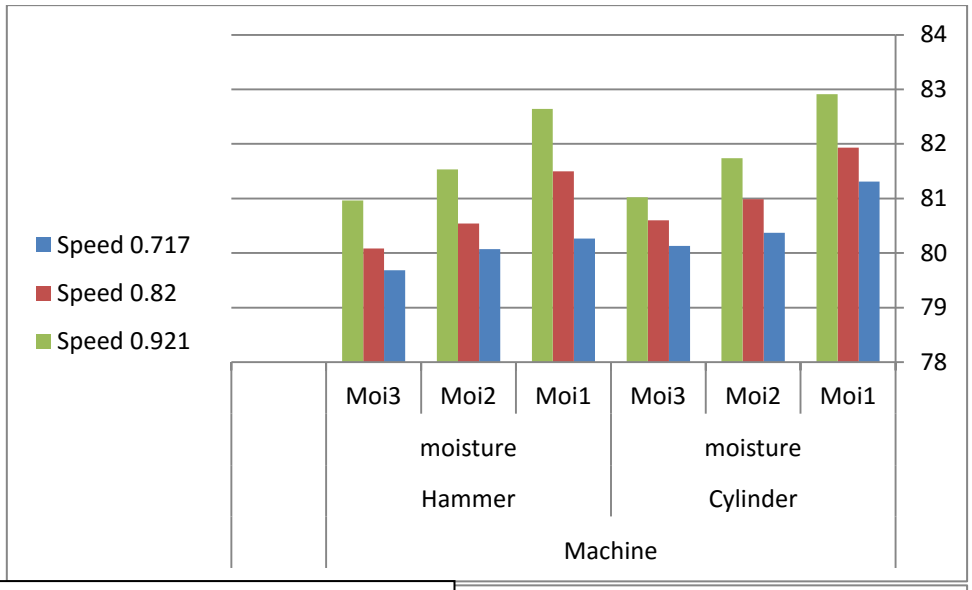
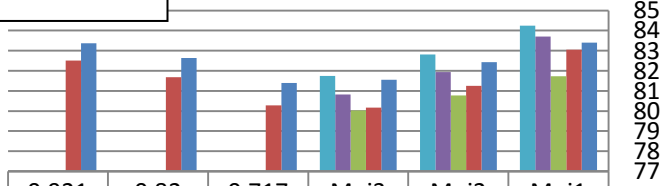


LSD=0.05,Machhne=0.236,Moisture= 0.289
Machine* Moisture=0.409
Machine* Moisture* Speed =0.709
Moisture*Speed = 0.501



	0.921	0.82	0.717	Moi3	Moi2	Moi1
	Speed			Moisture		
Machines Cylinder	83.373	82.632	81.392	81.556	82.437	83.404
Machines Hammer	82.506	81.685	80.282	80.173	81.246	83.054
Machines 0.717				80.018	80.771	81.722
Machines 0.82				80.825	81.939	83.712
Machines 0.921				81.75	82.815	84.252

Fig (6) IIIustartes effect type machines , Speed and Grain moisture in the Milling Efficiency % .

Figuer 6 shows the influence of the type of machine,clearance ,grain moistuer in the Degree of Milling % .The results indicated that the machine type Cylinder was significantly better than the machine type Hammer, by an increased of (1.19)%. Because efficiency and type machine, when used the machine type Cylinder , compared the machine type Hammer.These findings consistent with the findings of (Abu Al khair et al,2005) .Increasing the speed led to asignificant increase extrusive ,If excelled 0.717 on 0.820 and 0.921 by an increase of (1.6 and 0.9)%. respectively .This is due to increased milling efficiency with increased the speed to exploit the power of machine type Cylinder compared with machine type Hammer .These results are consistent with the results that gained by (Fang et al 2000). decreasing grain moisture led to a significant increase and form extrusive . If excelled percentage moistuer content of grain 13-15% it led to a significant increase, by an increase of (1.6 and 1.2)% respectively . Compared with the grain moisture 15-17% and 17-19%. This is due to increased moisture of grain led to hamper milling process,hence increased milling recovery when used machine type Cylinder.These results are consistent with the results that gained by (Al sherifi 2007).The overlap between the grain moisture and speed

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was significantly . While the superiority of overlap between the grain moisture 13-15% and speed 0.921 on overlap between the grain moisture 17-19% to speed 0.717 ,by an increase of (5.2)%.Also the overlap between the machine type speed was significant too because significant better, the overlap between the machine type Cylinder and the speed 0.921 comparing with the machine type Hammer to the speed 0.717 .By an increase of (3.8)%. While the overlap between the machine type and grain moisture was significantly .The highest milling efficiency, when the overlap between the type machine Cylinder and the grain moisture 13-15% comparing with the machine type Hammer to the grain moistuer 17-19% ,by an increase of (4.0)%. The best high rate (6.1)% have come from the triple overlap among type Cylinder ,grain moisture 13-15% and speed 0.921.

Conclusions:

1- The machine type Cylinder was significantly better on the machine type Hammer in all studied traits.
2- The grain moisture content 13-15% superiority significantly on two levels 15-17% ,17-19% in all studied traits .
3- The speed 0.921 superiority significantly on others two speed 0.717,0.820 in all studied traits.
4- The overlap between the machine type Satake and moisture content of grain 13-15% superiority significantly in all studies traits .And also overlap between the machine type Cylinder to speed 0.921 in all studied traits.
5- The best results have come from the triple overlap among machine type Cylinder, grain moisture (13-15%), and speed 0.921 .

Recommendations:

Recommends with carried out future studies using other of machinery types and other varieties of wheat.

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