

UTILIZATION OF MILLING MACHINE FOR SEPARATING GRASS SEEDS FROM ALFALFA SEEDS

EL-Sayed, G. H.*; Shreen, F. A. M.** and Y. A. Shabaan***

ABSTRACT

The purpose of this study was to increase the efficiency of rice milling machine, by using it as a multipurpose machine (milling – separation). The rice milling machine was used for separating grass seeds (Chicory and Clover Dodder) from alfalfa seeds under four treatment feed rates of 250,300,350 and 400 kg/h, three seed moisture contents of 8, 10 and 12 %, four speeds of cleaning air of 4.0, 6.0, 8.0 and 10.0 m/s and four sieve oscillates speed of 200, 230, 260 and 290 rpm. Those treatments were evaluated by determination of seeds losses and damage, purity percentage, energy and production cost. The results show that, the lowest value of seed losses of 2.0, 3.0 and 8.0 % were obtained at air speeds of 4, 6 and 8 m/s and feed rate of 250 kg/h and the lowest value of seeds damage was noticed at air speeds of 4m /s, moisture contents of 8 and 10 % and feed rate of 250 kg/h. Too, the maximum value of seeds purity of 98, 98.2, 98.3 and 98.5 % was obtained used feed rate of 250 kg/h, sieve oscillations of 200, 230, 260 and 290 rpm and air speeds of 6 m/s and moisture content of 10 % . The maximum value of machine efficiency was obtained under used sieves oscillation of 200 rpm with feed rate of 250 kg/h and cleaning air speed of 4 and 8 m/s While the minimum energy consumed of 4.5 kW/ton was obtained by using cleaning air speed of 4m/s and sieve oscillation of 200 rpm. The lowest cost of 265.4 LE/ton was recorded under parameter of air speed of 4 and 6m/s, sieve oscillation of 200rpm and feed rate of 250 kg/h.

INTRODUCTION

Rice milling machines are rife in Egypt because, rice is one of the most important crops in Egypt and its production role a significant in Egyptian trade balance. On account of the rice milling machines character rise by ease of replacement of any part of the milling machine and easily control the direction and speed of the air, making it easier to use in the process of separating the grass seeds from alfalfa seeds.

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Amin (2003) said that the sieving time, cell shape, and oscillating speed were the main factors that affected the separation efficiency. This efficiency increased by increasing sieving times and oscillating speed rpm. **Mehdi et al (2007)** study some physical properties of raw paddy (var. Sazandegi) are discussed briefly. At moisture content of 10 % (wet basis), the average seed length, width and thickness were 8.54, 2.47 and 1.83 mm, respectively while the equivalent mean diameter, surface area and volume were 3.4 mm, 32.58 mm² and 21.06 mm³, respectively. The sphericity and aspect ratio were 39.88 and 0.29%, respectively. True density, bulk density and porosity were 1193.38 kg m⁻³, 471.16 kg m⁻³ and 60.37 %, respectively while the static coefficient of friction varied from 0.2186 on glass sheet to 0.4279 on plywood. The angle of repose for emptying was 35.83°. The physical properties of paddy and rice, like those of other seeds and seeds, are necessary for design of equipment for handling, harvesting, processing and storing the seed or determining the behavior of the product for its handling (**Baryeh and Mangope, 2002**). **Werby (2010)** studied some physical and mechanical properties of alfalfa seeds, the results showed that cell shape, sieve tilt angle, sieve oscillation and air speed are the main factors that affect purity and total losses in cleaning. The purity increased by increasing air speed, sieve tilt angle and sieve oscillation. Total losses increased by increased air speed, sieve tilt angle and oscillation. The optimum performance of 98 % was at air speed of 6 m/s, moisture content of 10.5 %, sieve oscillation of 250 rpm, sieve tilt angle of 35, round shaped sieve 4 mm diameter, and feed rate of 500 kg/h. purity at these conditions was 99 % and total losses 1 %. Also, they stated that the studied physical and mechanical properties of three different varieties of clover seeds: Length, and width, for AL-Mesqawi, AL-Khadrawi and Al-Seadi were 2.40, and 2.10; 2.45 and 2.12 ; 3.00 and 2.10 mm respectively. Percent of sphericity and Volume for AL-Mesqawi, AL-Khadrawi and Al-Seadi were 87, 86 and 70 %; 4.55, 4.65, and 5.36 mm³ respectively. Terminal velocities for AL-Mesqawi, AL-Khadrawi and Al-Seadi were, 15, 15 and 16 m/s respectively. **Shreen and Khaffaf (2015)** measured physical and mechanical properties of Clover Dodder: length of 0.65mm, width of 0.60mm and thickness of 0.62 mm respectively, volume 0.13 mm³, geometric diameter 0.62 mm,

arithmetic diameter 0.62 mm, percentage of sphericity 95.84 %, bulk density 0.019 kg/m³, flat surface area 0.31 mm² transverse surface area 0.29 mm² mass of 1000-seeds 2.5 g and moisture content of 9.5%. And for Chicory seeds, the Physical properties: length, width, and thickness were 2.25, 0.60, and 1.12 mm respectively, volume 0.88 mm³, geometric diameter 1.19 mm, arithmetic diameter 1.35 mm, percentage of sphericity 52.92 %, bulk density 0.006 g/mm³, flat surface area 1.97 mm² transverse surface area 0.59 mm² mass of 1000-seeds 5.0 g and optimum moisture content of 9.0 %. They found that the terminal velocity value to suspend Clover Dodder seed was 2 m/s and hardness was 14.20 N and for Chicory seeds was 3 m/s. and hardness was 4.17 N, as well this research work targets in modify rice milling machine. This study aims to modify the milling rice machine to use as a multipurpose machine (milling – separation) for increasing the efficiency.

MATERIALS AND METHODS

To fulfill the objective of this study, two tons of alfalfa seeds were used to separate grass seeds (Clover Dodder and Chicory) from alfalfa seeds by using modified milling rice machine. The experimental work was carried out at a private machine in Owwad Sakr District, Sharkia Governorate Egypt during 2016 summer season.

The milling machine specification:

Fig.1. shows the ingredients milling machine used to separate grass seeds (Clover Dodder and Chicory) from alfalfa seeds. The type of machine is Mn 80 made in china, motor power of 11kW and weight of 150 kg. The parts specification of this machine which was used in separating process was:

Modify sieves:

The two oscillating sieves are pre-cleaner, simple and made from locally material. Sieves have different sizes depending on the size and shape of the tested seeds. The top sieve of dimensions (16 hole/mish and ϕ 5mm) and the shape circular has a slotted profile larger than the bottom one and both screens can be changed to suit the seed size or crop type. Seeds flow onto the oscillating sieve to separate large impurities such as chaff and straw.

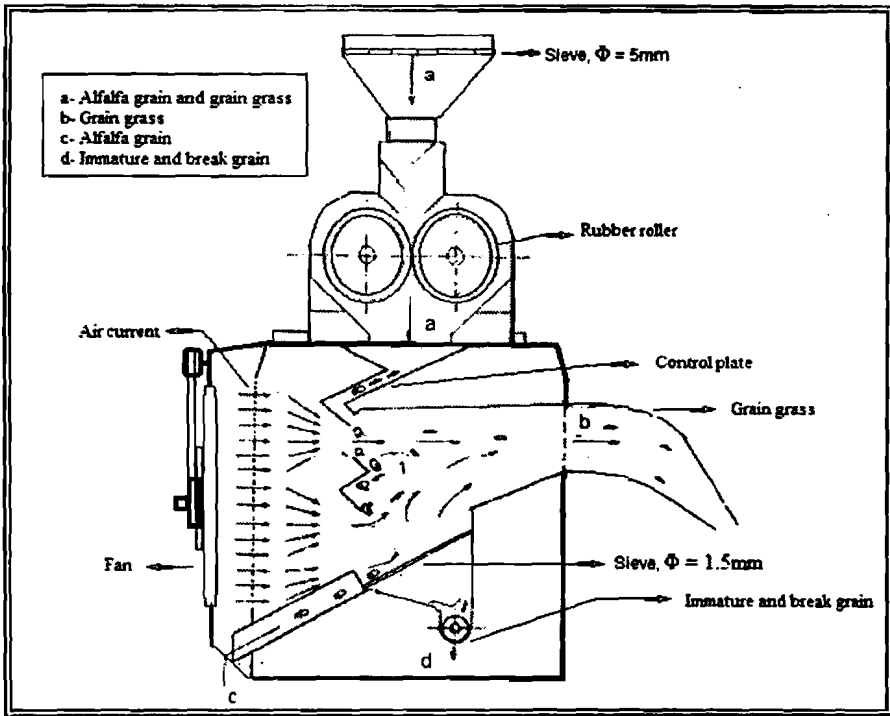


Fig. 1: Sketch view of the milling machine.

The feed rates which were used in this experiment were 250, 300, 350 and 400 kg/h. The bottom sieve oscillated for removing lighter impurities such as dust and dirt, by both of blowing or sucking air through the mass of falling seed through the opening of oscillating sieves. The sieving action of this machine is similar to top sieve oscillation cleaner. The measurement of hole diameter was 1.5mm and tilted at angle of 3 degree and the range of sieve oscillations was 200, 230, 260 and 290 rpm.

Rubber roller huller: The rubber-roller huller consists of two rubber rollers of the same diameter operated at different speeds. One roller has a fixed position and the other is adjustable to meet the desired clearance. Rubber-roll hullers have an aspirator in the base, the roll diameter of 150 mm and the roll width of 60 mm. The correct clearance is dependent on the varieties characteristics and the width and length of seed. So, this

experiment used three different clearances between the two drums (5, 7, 9 and 11mm) to control the amount of seeds which pass through them. The minimum clearance between two rolls was of 5mm which was allowed the seed to pass without damage because this dimension was less than the maximum length of seed; these clearances were used to regular the amount seeds which flow in unit time and control the feed rate. Whereas the clearance between the two drums was 5, 7, 9 and 11mm the seeds amount which pass in hour were 250, 300, 350 and 400kg respectively.

Blower: The blower is made of metal sheet of 1 mm thickness. The blower fan assembly consists of six bladed radial fans, driver from electric motor with V-shape pelt bully. The fan discharges air blast through the sieve perforations.

Measuring instrumentation:

Electrical balance: An electronic balance was used for weighing samples before and after cleaning. Its scale ranged from 0 to 5 kg max., with accuracy of 0.2 g.

Anemometer instrument: An anemometer instrument (SATAKE CO., Japan) was used for measuring the air speed. It is ranged from 0 to 50 m/s. The measurement theory depends on the declination of the sensor inside the instrument.

Moisture content meter: Moisture content of alfalfa seeds was determined by using as electronic moisture meter. Its specifications were as following: Type: GANN Hydromelle G 86, Made in Western Germany.

Measurements:

The alfalfa seed damaged.

Random seed samples each of five kilograms were collected from the product of each treatment. Each sample was divided manually into ten equal parts. Each part was divided into five small parts each of about 100g. Each sample of 100g has been distributed on a flat glass plate to sort the product into three main categories namely broken and injured seeds (seeds damaged)

Then, the percent of each component could be estimated as follows:

$$\text{Seeds damaged, \%} = \frac{(B+I)}{T} \times 100 \dots\dots\dots(1)$$

Where:-

B= Mass of broken seeds, g; I= Mass of injured seed, g and T= Total mass of sample, g.

Alfalfa seed losses.

The alfalfa seed losses were determined by taking random samples from sieves and air current product. Sample by mass 1kg was taken and divided into five samples and the number of alfalfa seeds in each sample was determined. The following items are determined by using equation

$$\text{Total seeds losses} = \frac{W_d + W_u}{W_i} \times 100, \% \dots\dots\dots (2)$$

Where:-

W_d is mass of alfalfa seeds in sieve product, g.

W_u is mass of alfalfa seeds in air current product, g. and

W_i is mass of total input seeds, g.

Machine performance:

The following items are determined as cited by **Srivastava et al. (2006)**:

Actual machine capacity (AC):

$$AC = \frac{1}{AT}, \text{ ton/h} \dots\dots\dots (3)$$

Where:

AT is actual total time required for cleaning one ton of alfalfa seed, h.

$$\text{Machine productivity} = \frac{W_c}{AT}, \text{ ton seeds/h} \dots\dots\dots (4)$$

Where; W_c is mass of clean seeds, ton/h.

Machine efficiency (η):

$$\eta = \frac{AC}{TC} \times 100, \% \dots\dots\dots (5)$$

Where:

AC is the actual machine capacity, ton/h

TC is theoretical machine capacity, ton/h.

Specific energy consumption:

To compute the energy consumption, similar electrometers model (CA4-N672T) has been used to measure the electrical energy consumption; this value was added to specific human energy consumption.

Specific laborer energy requirements:

The following items were determined as cited by *Srivastava et al. (2006)*:

$$\text{Laborer energy requirements} = 3.61 \times 0.075 \times AFC^h \times NI, \text{ kJ} \dots\dots\dots (6)$$

Where:

0.075 is power of laborer, kW/h.

NI is number of laborers.

AFC^h is manual capacity, 0.2 Ton/h.

Total energy requirements = account the electrical + human energy

$$\text{Output energy requirements} = \frac{\text{Total energy requirements}}{\text{Machine productivity}}, \text{ kW/ton} \dots\dots\dots (7)$$

Costs:

As cited by *Begum et al. (2012)*, separation costs (LE/h) are calculated by employing the conventional method of estimating both fixed and variable costs.

$$\text{Separation criterion costs} = \frac{\text{operational costs (LE/h)}}{\text{Machine productivity}} + \text{losses grains price, LE/ton} \dots\dots (8)$$

Factor relating to the constructed separating machine:

The following factors were tested to show their effect on separation effectiveness:

- 1- Feed rate: 250, 300, 350 and 400 kg/h.
- 2 – Air speed: 4, 6, 8 and 10 m/s.
- 3 - Sieve oscillations: 200, 230, 260 and 290 rpm.
- 4 – Moisture content: 8, 10 and 12%.
- 5 – Sieve tilt-angle: 3 degree.

Data analysis: complete randomized block design is selected to study the effect of seed moisture content, feeding rate, sieving oscillating, and air speed as dependent variables as a function of alfalfa seed losses, seed damage and purity as independent variable. These relationships are tested

by using an analysis of variance and predicting the change of dependent variables by using SPSS version-20.0 (SPSS, Inc., Chicago, IL, USA).

RESULTS AND DISCUSSION

Effect of cleaning air speed, moisture content and feed rate on seed losses:

The obtained result illustrated that by increasing cleaning air speed the seed losses are increased under treatment tested feed rates. So, by using feed rate of 250 kg/h the seed losses are increased by average of 1.4 % under used air speeds of 4, 8, 10 and 12 m/s. The minimum value of seed losses of 2.0 % was noticed under used feed rate of 400 kg/h, moisture content of 12 % and air speed of 4m/s and the maximum value of 5.3 % was noticed by using feed rate of 250 kg/h, moisture content of 8% and air speed of 8 m/s. Furthermore, when moisture content was increased by average of 2 % the seed losses are decreased by average of 1.2 % under stable feed rate and air speed. Increased losses are due to increase of air quantity and decreased feed rate therefore a low number of seeds were exposed to high quantity of air so, pushing more seeds. Above mentioned results suggested that the lowest values of seed losses of 2.0, 3.0 and 8.0 % were obtained at air speed of 4,6and8 m/s, feed rate of 250 kg/h and moisture content 10 %. But, by increasing moisture content of 2 % the seed losses were decreased by average of 0.4 %. These data was shown in Fig.2. Furthermore, by analyzing the results statistically and determine the value of the correlation coefficient ,it was found to be equal to 0.80 this shows that there is effect of air speed, moisture content and feed rate on seeds losses and this relationship is a positive.

Effect of air speed, moisture content and feed rate on seeds damage:

Under stable sieves oscillations, the data in Fig. 3 show that by increasing air speed by 2 m/s the seeds damage was increased by average of 1.5 %. Too, by increasing feed rate by 50 kg/h the seeds damage was increased by average of 2.3 %. The minimum value of seeds damage 1.5 and 2.0 % was noticed under feed rate of 250 kg/h, moisture content of 8 and 10 % air speed of 4 m/s and the maximum value of 6.4 % was noticed under used feed rate of 400 kg/h, moisture content of 12 % and air speed of 10 m/s. Furthermore, when moisture content was increased by average of 2 % the seeds damage was increased by average of 1.4% under stable feed

rate and air speed. Increased in seeds damage were due to increase of feed rate therefore the high number of seeds which try to pass between two roll so, the seeds were exposed to compress. Furthermore, by analyzing the results statistically and determine the value of the correlation coefficient, it was found to be equal to 0.63 this shows that there is mean effect of air speed, moisture content and feed rate on seeds damaged and this relationship is a positive.

Effect of air speed, moisture content and feed rate on seeds purity: Under stable sieves oscillations, the data in Fig .4 show that by increasing air speed by 2% the seeds purity was increased by average of 4.5 %. Too, by increasing feed rate by 50kg/h the seeds purity was decreased by average of 2.5 %. The minimum value of seeds purity of 89 % was noticed under feed rate of 400 kg/h, moisture content of 12 % and air speed of 4 m/s and the maximum value of seeds purity of 98 % was noticed under used feed rate of 250 kg/h, moisture content of 10 % and air speed of 6, 8 and 10 m/s (there are no significant between the values of seeds purity by using air speed of 6, 8 and 10 m/s) because, seed movement's ability to be less by increasing moisture content. Furthermore, when moisture content was increased by average of 2 % the seeds purity was decreased by average of 1.15 % under stable feed rate and air speed. Increased in seeds purity were due to increase of air quantity and decreased feed rate therefore the low number of seeds exposed the high quantity of air so, more than in seeds purity. Above mentioned results suggested that the highest values of seeds purity were noticed at air speed 6, 8 and 10 m/s and moisture content 8 and 10 % and feed rate 250 kg/h. The grasses seeds were removed by using air current which comes from cleaning fan. The alfalfa seeds work by making use of differences in specific gravity, buoyancy and size between alfalfa seed and grasses seeds. Grass seed has a lower specific gravity and higher buoyancy than alfalfa seeds. Furthermore, by analyzing the results statistically and determine the value of the correlation coefficient ,it was found to be equal to 0.46 this shows that there is medium effect of air speed, moisture content and feed rate on seeds purity and this relationship is a positive.

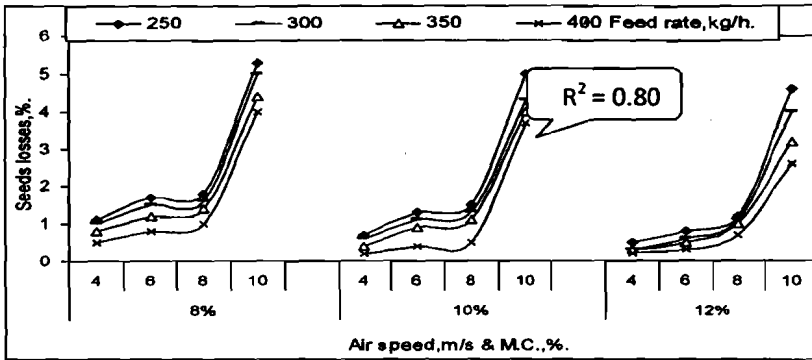


Fig. 2: The effect of air speed, moisture content and feed rate on seed losses.

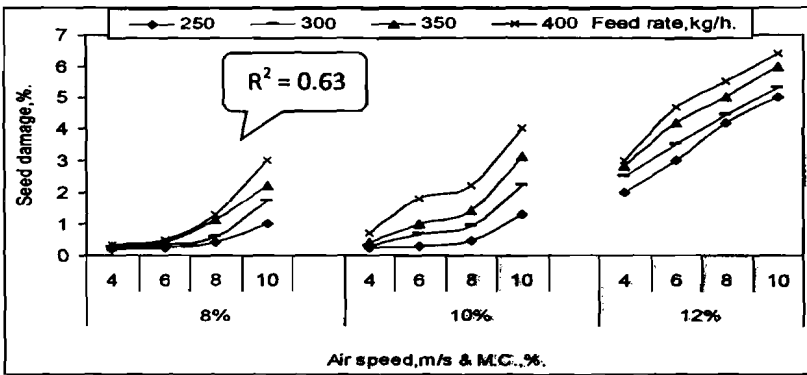


Fig. 3: The effect of air speed, moisture content and feed rate on damaged seeds.

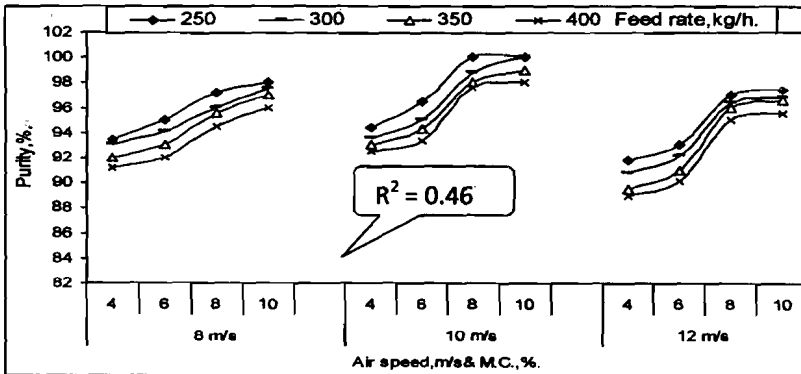


Fig.4: Effect of air speed, seed moisture content and feed rate on seeds purity.

Effect of air speed, sieve oscillations and feed rate on seeds purity:

Through previous results showing that the best moisture content for separate was 10 %. And the optimum sieve tilt-angle of 3degree (Werby2013) .The data in Fig. 5 shown that by increasing air speed the seeds purity was increased by average of 6.6 %. Too, by increasing feed rate the seeds purity was decreased by average of 13.7 %. The minimum value of seeds purity of 85 % was noticed under used feed rate of 400kg/h, sieve oscillations of 200rpm and air speed of 4m/s and the maximum value of seeds purity of 98.1, 98.2, 98.3 and 98.4 % was noticed under used feed rate of 250 kg/h, sieve oscillations of 200, 230, 260 and 290 rpm and air speeds and there was no significant value between used air speed 6and 10 m/s. This was due to the alfalfa and grass seeds move over an inclined plane, they move at different speeds depending on their specific gravity, their shape and contact area, smoothness of inclined surface and the co-efficient of sliding friction. Alfalfa seeds are bigger, heavier, rounder and smoother and will slide faster than grass seeds. Furthermore, when a sieve oscillation was increased by 30 rpm the seeds purity was increased by average of 0.2 % under stable feed rate and air speed. The increase in seeds purity was due to increase of movement of material fast on the sieve giving less chance for straw and impurities to pass through the seed spout. The above mentioned results suggested that the highest values of seeds purity were noticed at air speeds of 6 m/s and sieve oscillations of 200 rpm and feed rate of 250 kg/h. Furthermore, by analyzing the results statistically and determine the value of the correlation coefficient ,it was found to be equal to 0.92 this shows that there is a strong effect of air speed, sieve oscillations and feed rate on seeds purity and this relationship is a positive.

Effect of air speed, sieve oscillations and feed rate on seeds losses:

The previous results showing that the best moisture content for separation was 10 %. And the optimum sieve tilt-angle of 3degree (Werby2013). The data in Fig. 6.show that by increasing air speed the seeds loss was

increased by average of 6.6%. Too, by increasing feed rate the seeds purity was decreased by average of 17.5%.

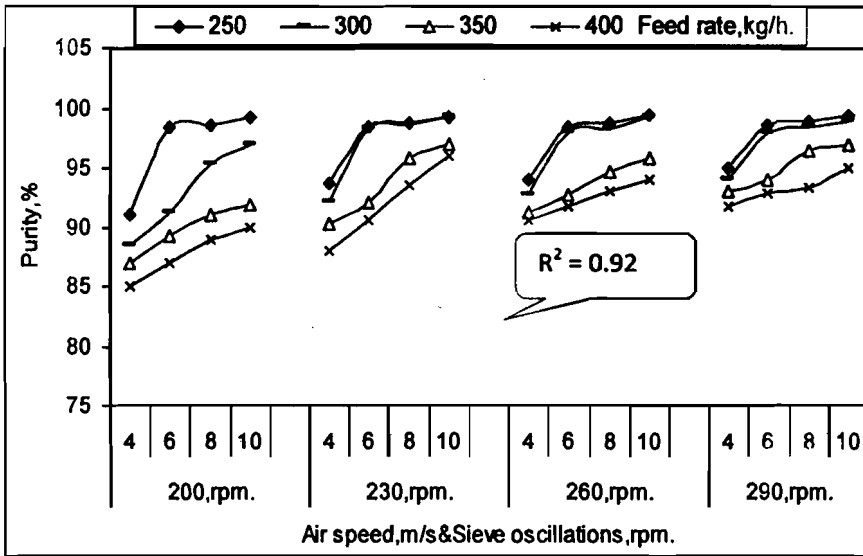


Fig.5: Effect of air speed, sieve oscillations and feed rate on seeds purity.

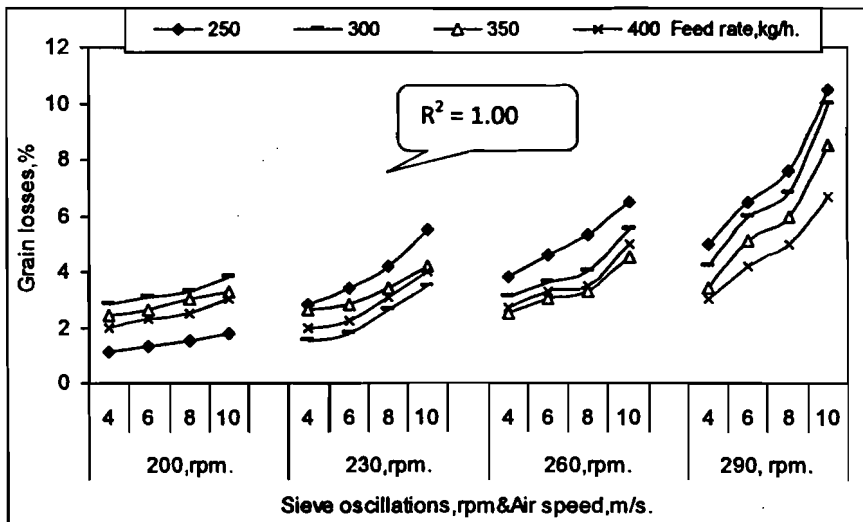


Fig.6: Effect of air speed, sieve oscillations and feed rate on seed losses.

The minimum value of seeds losses of 1.5% was noticed under used feed rate of 250 kg/h, sieve oscillations of 200rpm and air speed of 4 and 6m/s and the maximum value of seeds losses of 18.5 % was noticed under used feed rate of 250kg/h, sieve oscillations of 290 rpm and air speed of 10 m/s. This was due to, seed movement is gaining kinetic energy as a result of the movement of a sieve and increases with increase the speed of a sieve, which increases the speed of seed, this was due to start the seeds go outside the scope of a sieve, which increases the rate of seed losses and this was due to, the kinetic energy distribution of a smaller quantity of seed so increase its speed and thus increase the rate of seed losses. Furthermore, when a sieve oscillation was increased by average of 30 rpm the seed losses were increased by average of 2.7 % under stable feed rate and air speed. Above mentioned results suggested that the highest values of seed losses were noticed at air speed of 10 m/s and sieve oscillation of 290 rpm and feed rate of 250 kg/h. Furthermore, by analyzing the results statistically and determine the value of the correlation coefficient ,it was found to be equal to 0.94 this shows that there is strong effect of air speed, sieve oscillations and feed rate on seeds losses and this relationship is a positive.

Machine efficiency:

Effect of air speed, sieve oscillations and feed rate on machine efficiency is shown in table 1. The data in this table illustrated that, the maximum value of machine efficiency was noticed under used sieves oscillation of 200 rpm with feed rate of 250kg/h and cleaning air speed of 4 and 6 m/s, on the whole, the optimum cleaning air speed of 6 m/s was gave the maximum value of machine efficiency under used most treatments.

Effect of cleaning air speed and sieve oscillation on consumed energy:

Fig. 7 shows that by increasing cleaning air speed, the consumed energy will increase. The maximum consumed energy of 7.5 kW/ton was obtained by using cleaning air speed of 10m/s and sieve oscillation 290 rpm. While the minimum consumed energy of 4.5 kW/ton was obtain by using cleaning air speed 4m/s and sieve oscillation 200 rpm.

Table .1: The relation between feed rate, cleaning air speed and sieve oscillation on machine efficiency.

Machine feeding rate, kg/h	Cleaning air speed, m/s.	Machine efficiency, %.			
		Sieve oscillation, rpm.			
		200	230	260	290
250	4	98.0	97.5	96.2	95.0
	6	98.7	96.6	95.4	93.4
	8	98.4	95.8	94.7	92.4
	10	96.1	94.5	93.5	89.4
300	4	97.2	97.2	96.9	95.8
	6	96.9	98.2	96.4	94.0
	8	96.7	97.4	96.0	93.2
	10	96.2	96.5	94.5	90.0
350	4	96.6	97.2	97.6	97.4
	6	94.9	97.0	97.4	97.0
	8	94.0	96.7	97.0	96.6
	10	91.5	95.5	96.7	95.8
400	4	97	97.3	98.0	98.2
	6	95.8	96.7	97.5	97.7
	8	95.0	96.5	96.9	97.5
	10	93.3	95.2	96.0	97.0

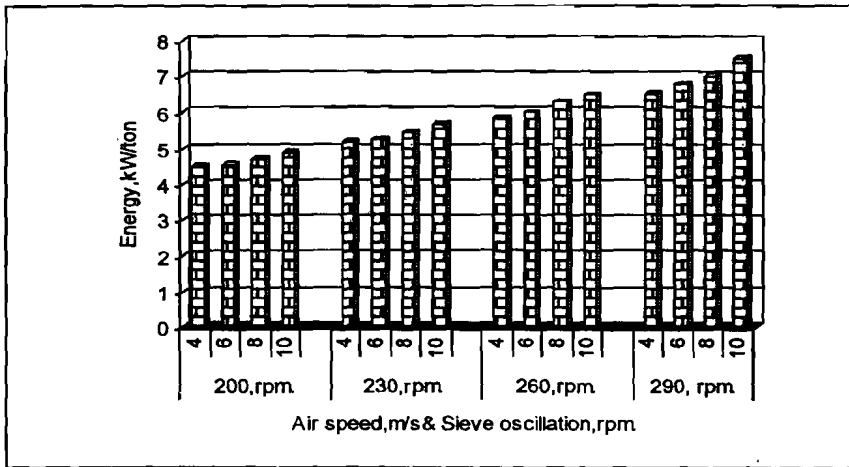


Fig. 7: Effect of cleaning air speed and sieve oscillation on consumed energy.

Effect of cleaning air speed sieve oscillation and feed rate on criterion cost requirements:

The criterion cost is highly affected by seed losses and its price. The effect of parameter on cost was shown in Fig. 8. The data showed that the lowest production cost of 265.4 LE/ton was recorded under parameter of air speed of 4 and 6 m/s, sieve oscillation 200 rpm and feed rate 250 kg/h. Furthermore, the lowest values of production cost were appear under used feed rate 300, 350 and 400 kg/h with sieve oscillation 230, 260 and 290 rpm this was farther to decrease the seed losses amount.

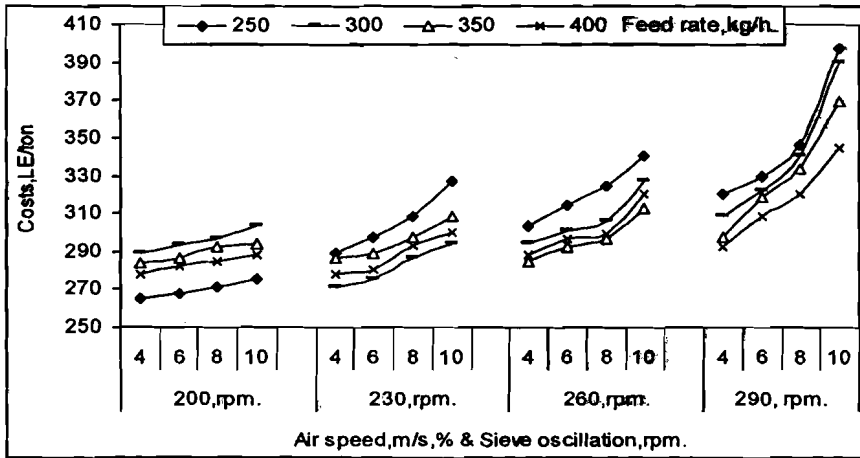


Fig.8: Effect of cleaning air speed, sieve oscillation and feed rate on criterion cost requirements.

CONCLUSION

The obtained results from this investigation can be concluded as follows:
 The lowest values of seed losses of 2.0, 3.0 and 8.0 % were obtained at air speed of 4,6and8 m/s, feed rate of 250 kg/h and moisture content 10%. The minimum value of seeds damage 1.5 and 2.0 % was noticed under feed rate of 250 kg/h, moisture content of 8 and10 % and air speed of 4 m/s. the maximum value of seeds purity of 98% was noticed under used feed rate of 250 kg/h, moisture content of 10 % and air speed of 6, 8 and10 m/s. the maximum value of seeds purity of 98.1, 98.2, 98.3and 98.4 % was noticed under used feed rate of 250 kg/h, sieve oscillations of 200, 230, 260 and 290

rpm and air speeds of 6 m/s and moisture content of 10 % . The minimum value of seeds losses of 1.5% was noticed under used feed rate of 250kg/h, sieve oscillations of 200rpm and air speed of 4 and 6m/s. The maximum value of machine efficiency was noticed under used sieves oscillation of 200 rpm with feed rate of 250kg/h and cleaning air speed 4 and 6m/s. The minimum energy consumed of 4.5 kW/ton was obtained by using cleaning air speed 4m/s and sieve oscillation 200 rpm. The lowest cost of 265.4 LE/ton was recorded under parameter of air speed of 4 and 6 m/s, sieve oscillation 200 rpm and feed rate 250 kg/h.

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الملخص العربي

استخدام مضرب تبييض الارز في فصل بذور حشائش البرسيم

جمال حسن السيد* - شرين فؤاد عبدالحميد محمد** - يسرى عبد القوى شعبان***

لقد أظهرت الدراسات السابقة أن هناك اختلاف في الخواص الميكانيكية والفيزيائية لحبوب البرسيم والحشائش التي تنمو معاً وخاصةً بذور الحامول والبرسيم، وهما من أكثر الحشائش التي تؤثر على نمو النبات بالتالى على المحصول.

ونظراً لزيادة معدلات تشغيل آلة الدراس الثابتة واستخدامها في دراس وفصل البذور عن التبن في كثير من المحاصيل مثل القمح والبرسيم والمحاصيل البقولية وقد هيئة الآلة لأداء تلك العمليات بأعلى كفاءة، ولكن هناك عملية فصل أخرى تتم يدوياً لفصل بذور الحشائش (البرسيم والحامول) عن بذور البرسيم.

لذلك تم تهيئة مضرب الارز لإستخدامة في عملية الفصل تلك، عن طريق زيادة الخلوص بين رولات التفشير من ١,٥ مم الى (٥، ٧، ٩ و ١١ مم) وذلك لعدم الاضرار بالبذرة لان هذه الفتحة أكبر من أقطار البذور والتحكم في انتظامية معدلات التلقيم مع ايقاف الحركة الواصله الى رولات التبييض.

عوامل الدراسة:

- أربع معدلات للتلقيم ٢٥٠، ٣٠٠، ٣٥٠ و ٤٠٠ كجم/ساعة

أربع معدلات لدرجة اهتزاز غربال الفصل ٢٠٠، ٢٣٠، ٢٦٠ و ٢٩٠ لفة/دقيقة

- ثلاث نسب لرطوبة حبوب البرسيم ٨، ١٠ و ١٢ %

- أربع سرعات لهواء التنظيف ٤، ٦، ٨ و ١٠ م/ث

وتم تقييم تلك العوامل من خلال دراسة محلل فقد الحبوب مع نواتج الفصل لهواء التنظيف وأسفل غربال الفصل تحت السرعات المدروسة، تحديد النسبة المئوية لتحطم الحبوب ودرجة نقاؤها وكفاءة الآلة تحت معاملات الدراسة، حساب الطاقة المستهلكة وتكاليف الفصل.

وكانت نتائج الدراسة كالتالى:

- أقل قيم للبذور المقفودة هي ٢، ٣ و ٨ % وذلك بإستخدام محلل تلقيم ٢٥٠ كجم/س وسرعة هواء التنظيف ٤، ٦ و ٨ م/ث ونسبة الرطوبة ١٠%.

- أقل نسبة تحطم البذور كانت ١,٥ و ٢ % وذلك بإستخدام محلل تلقيم ٢٥٠ كجم/س و نسبة الرطوبة في الحبوب ٨ و ١٠ % وسرعة هواء التنظيف ٤م/ث.

* رئيس بحوث - معهد بحوث الهندسة الزراعية - مركز البحوث الزراعية - دقى - جيزة.

** باحث اول -معهد بحوث الهندسة الزراعية - مركز البحوث الزراعية - دقى - جيزة.

*** باحث - معهد بحوث الهندسة الزراعية - مركز البحوث الزراعية - دقى - جيزة.

- أكبر قيمة لدرجة نقاوة البنور ٩٨ الى ٩٨,٤ % وذلك باستخدام معدل تلقيم ٢٥٠ كجم/س و نسبة الرطوبة فى الحبوب ١٠% وسرعة هواء التنظيف ٨ و ١٠ م/ث ودرجات اهتزاز لغريال الفصل ٢٠٠، ٢٢٠، ٢٦٠، و ٢٩٠ لفة/د حيث أن درجة نقاوة البنور متقاربة تحت استخدام درجات اهتزاز الغريال المختلفة.
- أقل قيمة للطاقة الانتاجية ٤,٥ كيلوات/طن باستخدام معدل تلقيم ٢٥٠ كجم/س ودرجة اهتزاز غريال ٢٠٠ لفة/د وسرعة هواء التنظيف ٤ م/ث.
- أقل قيمة لتكاليف الانتاج ٢٦٥,٤ جنيه/طن باستخدام معدل تلقيم ٢٥٠ كجم/س ودرجة اهتزاز غريال ٢٠٠ لفة/د وسرعة هواء التنظيف ٤ م/ث.
- ومن هنا يوصى باستخدام مضرب تبيض الارز فى فصل بذور الحشائش(الحامول- السريس) عن بذور البرسيم وذلك بلاستخدام معدل تلقيم ٢٥٠ كجم/س وسرعة هواء من ٤ الى ٦ م/ث ودرجة اهتزاز لغريال الفصل ٢٠٠ لفة/د ونسبة رطوبة الحبوب ١٠%.