RESPONS OF NEW WHEAT VARIETIES TO SOME SEEDBED PREPARATION METHODS AND SEEDING RATES

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ABSTRACT

The production of food still the challenge for Egyptian planning, The experiments were carried out during 1999/2000 and 2000/2001 seasons at Gemmeiza Research Station, El-Garbia Governorate, The objective of the present study is to study the effect of some seedbed preparation systems and seeding rates on productivity .of some new wheat cultivars and obtain the technical package for each of them. Three seedbed preparation systems (T) were conducted as follows :

1-Chisel plow two passes..
2- Local combined unit for seedbed ,preparation (chisel plow +rotary plow).
3-Chisel plow one pass followed by disc harrow.

Three seeding rates (S) (40, 50 and 60 kg seeds/ fed.)and four wheat cultivars were used (Sakha 93, Gemmiza 7, Giza 168 and Gemmiza 9).

The results of the present investigation indicated that:

The use of local combined unit for seedbed preparation (chisel plow + rotary plow) had a significant effect on heading ,maturity, plant height, number and weight of grains/spike, 1000-grain weight, number of spikes/m^2 and grain and straw yields.Increasing seeding rates from 40 up to 60 kg seeds/fed. came to heading and maturity early. Also, the tallest plants and highest number of spikes/m^2were produced by seeding rate of 60 kg/fed. – while, number of grains/spike , grain weight/spike and 1000-grain weight were significantly decreased as the seeding rates increased up to 60 kg/fed. Gemmiza 7 wheat cultivar surpassed the others in plant height , number of grains/spike, grain weight /spike and 1000-grain weight . While as Gemmiza 9 was the leading cultivar and superior the other cultivars in number of spikes/m^2 and grain and straw yields/fed.The interactions between cultivars x seed-bed preparation system, cultivars x seeding rates and seedbed preparation system x seeding rates were significantly affected on heading , maturity, plant height, 1000-grain weight number of grains/spike, number of spikes/m^2 and grain and straw yields/fed. While, the interaction between cultivars x seedbed preparation x seeding rates had a significant effect on plant height in the second season . The results of indicated that the use of local combined unit and sowing with the rate of 60

kg seeds/fed. of Gemmiza 9 wheat cultivar proved to be the most suitable treatments for the best wheat productivity.

INTRODUCTION

The target problem of food production in Egypt is one of the most important case. The shortage of local wheat production was about 40% of our needs. Enhancement of crop productivity is separable from the resource base. The goal of agriculture should be increase and maintain high yield levels of food crops per unite of area, water, energy input, water and time.To avoid this problem many attempts were executed in many directions such as improving soil fertility, introducing new promised varieties or crop land expansion and new improved technical methods. Wheat is considered as an unique crop in its adaptability to different methods of tillage (El-Sahrigi, and Abou-Habaga (1993).

In Egypt wheat planting methods, varied from one location to another. Many factors were identified by Hakanssen and Von Polgar (1984) to decisive for cultivars , seed rate, seed germination and crop emergence. Some of these factors characterize the seedbed at sowing time such as soil type, depth of the seedbed, aggregate size distribution, including stratification, compactness of the layer directly below the seedbed, moisture content and characteristics of different layers and special distribution of the seed, especially the depth of distribution. The other factors which determine or modify the condition in seedbed during germination and emergence are temperature, precipitation (time, amount, intensity), potential evaporation, and any post sowing tillage operation (rolling, harrowing, crust breaking). Also,the factories characterizing the seed were included such as crop species, variety and seed rate. They also reported that the optimum sowing depth was influenced by other variables and increased with increasing moisture content and with increasing aggregate size, i.e. with decreasing efficiency of protection against evaporation.Some of these factors were also studied by El-Sahrigi and Ghazy (1991) They found that by increasing sowing depth the germination ratio was decreased.They also found good relation between sowing depth (x) and the germination ratio (Y) with correlation coefficient of 0.93 as follows:

$Y = 98.443 - 8.612\ x$ ---------- 1

Other modified tillage systems were studied by El-Sheikha (1989), Abd El-Mageed and El-Sheikha (1993), Abdou (1995) and Bahnas(1999) according to seed germination as follows:-

a-Combination unit and chiseling followed by rotary tiller reached the highest germination values of 88 and 97% giving crop yield of 3.80 ton /fed.

b-Chiseling two passes followed by harrowing, chiseling one pass followed by harrowing and rotary tiller alone gave acceptable seed germination values of 76 – 85%.

Abou-Habaga (1992) found that increasing the mean weight diameter of clods in the seedbed increased the sowing depth, plant deviation from the row and the time required for seedling emergence. The suitable cbds size distribution at silt loam soil for sowing the wheat crop with a grain drill machine having diameter not greater than 50 mm . This could be obtained after using a chisel plow followed by rotary tiller at soil moisture content ranged from 18 to 22%.

Management must be predicted on a scheme that integrates the entire systems. Interacting factors such as crop cultivars, seed rate, row spacing, seedbed preparation methods, harvesting procedures and environmental concerns led to a complexity that can't accommodate without sophisticated management schemes. So the objectives of the present research were to evaluate the effect of different seedbed preparation systems on wheat varieties and seed rate and to adopt the suitable method in respect to the lowest energy requirements and maximum yield.

MATERIALS AND METHODS

Two field experiments were carried out at Gemmeiza Agricultural Research Station , A.R.C., during the winter seasons of 1999/2000 and 2000/2001 to compare three Seedbed preparation systems:

1-Chiseling two passes + leveling (T1)

2- Local combined unit for seedbed preparation (chisel plow + rotary plow) + leveling (T2)

3-Chiseling one pass followed by disc harrow + leveling (T3)

Seed-bed preparation implements:-

The following implements were used for seed-bed preparation:

- A mounted chisel plow (El-Bihara Co.) consisted of seven shanks arranged in two rows.
- A rotary tiller (Egyptian mode) of 175 cm width
- A disk harrow (167-Athens U.S.A. made) of 185 cm width.
- A combined unit locally made (chisel plow + rotary plow)
- A leveling scraper (El-Bihara Co.) of 240 cm. blade width.

Planting implements:

Mounted seed-drill (Sulky type) 25 rows, 12 cm. distances between rows, and 3.5m long was used for planting wheat

Seeding rate:-

Three seeding rates:of 40 (S1), 50 (S2) and 60 (S3) kg seeds /fed. .

Cultivars :-

Four cultivars of wheat namely Sakha 93 (V1) , Gemmiza 7 (V2), Gemmiza 9 (V3) and Giza 168 (V4).*Triticum aestivum L.*

Preceding crop was cotton in both seasons. The experiments were carried out in clay loam soil after cotton harvest. A split split plot design with four replications was used . Tillage systems were randomly distributed in the main plots while, seeding rates were randomly distributed in the sub plots and cultivars were distributed in the sub-subplots. Sub – sub plot was 10.5 m^2 (3.5 m long and 3 m wide). Nitrogen was added at 75 kg nitrogen per feddan in the form of urea (46%N) in two equal portions, the first dose was applied before the first irrigation and the rest was applied before the second irrigation. Wheat was planted on November 20 and 25 in the two seasons respectively. Heading date (days from planting to 50% heading) and number of days to maturity were determined.

At harvest, plant height was measured , number of spikes/$m^2$and sub-sub plots were harvested to determine grain yield (ardab/feddan) and straw yield (Ton/feddan).From each sub-sub plot 20 spikes were taken to determine the following characters: number of grains/spike, grains weight/spike (g) and 1000-grain weight.

All data were statistically analyzed according to procedures outlined by Gomez and Gomez (1984). The mean values were compared according to Duncan's Multipla Range Test (Duncan,1955).

Source of power:-

1-Nasr Tractor KW (60 hp). was used with seed drill.

2-Alles-Challmers tractor KW(80 hp) was used with all implements of seedbed preparation and land leveler except combination unit.

3-Ford tractor KW(120 hp)was used with combined unit.

The measurements were divided into three sections as follow:

1- Soil measurements:-

Soil bulk density (Bd.):-

It was determined at three depths (0-75, 75-150, and 150-225 mm.) according to following equition Bd = Ws / V g/cm^3 (Black 1965)

Where: Ws = dray soil mass (g) and V = soil volume in cm^3.---------- 2

Soil porosity (p)and void ratio (n):

Volume of pore space as the ratio to the total soil volume can be determined as the soil porosity by using the following formula

where: P= (Ad – Bd.)/Ad x 100= [(1 – Bd.) /Ad]x100 (Black 1965)------ 3

Ad = the absolute density of the soil (2.71 g/cm^3)

The void ratio (n): (The ratio of volume of voids to the volume of solids) can be determined as follows:

$$n = (Ad / Bd.) - 1 \quad \text{---------- 4}$$

Soil clod diameter :-

Clod diameter was measured by using crumb structure measuring device. It consisted of seven sieves having different mesh sizes. The sieves diameter was 20 cm and the mesh sizes are 100, 50, 30, 20, 10, 5 and 2 mm. After seed-bed preparation, soil samples were randomly taken from five different places of each plot and air dried The sieve apparatus containing the soil samples is put into motion in a semi-circular fashion for one minute. After sieving all the individual fraction, were weighed and converted as a percentage of total sample weight.

The formula of (Rnan 1983) was used to determine the mean mass clod diameter (M.W.D) as follows:

$$M.W.D = 1/W(A + 3.5B + 7.5C + 15D + 25E + 40F + 75G + NJ) \quad \text{--------- 5}$$

Where W = Total weight of soil sample, g ;.

A, B, C, ... G = mass of soil in each sieve, g ;

N = Mean of measured diameter of soil clods retained on the largest sieve mm and

J = Mean of measured diameter of soil clods retained on the smallest sieve mm .

The mass of aggregate size greater than 20 mm in respect to weight of aggregates size smaller than 20 mm was indicated by index"C" according to Abou-Habaga (1992) as follows:

$$C = Wg / Ws \quad \text{---------- 6}$$

Where : Wg = mass of aggregates (∅> 20 mm), g, and Ws = mass of aggregates (∅< 20 mm), g.

2 - Consumed energy (c.e.):

Consumed energy per feddan was calculated through measuring the fuel consumption for each field operation. The tractor was instrumented to measure run time and fuel consumption.

Consumed energy (c.e) in (k.w.) can be calculated using the conversion formula as follow:

$$c.e. = Fc \times Fd \times CV \times 427/75 \times 0.735 \times \eta_{th} \times \eta_m \ldots\ldots KW. \quad \text{---------- 7}$$

$$= 4.18 \times Fc \times Fd \times CV \times \eta_{th} \times \eta_m \ldots\ldots\ldots\ldots KW. \quad \text{---------- 8}$$

Where: Fc = The fuel consumption lit / s;.

Fd = Density of diesel oil kg / lit. (for solar F.d = 0.85 kg / lit);

CV = calorific value of fuel k cal. /kg (for solar =10^4 k cal. /kg);.

427 = Thermo-mechanical equivalent kg.m / k cal ;.

75 = Value of hp. kg .m / s;.

η_{th} = Thermal efficiency of engine (considered to be 40 % for diesel engine) and

η_m = mechanical efficiency of engine (considered to be 80 % for diesel engine).

Yield and yield component:-

The yield and yield component was measured as indicator for each treatment.

RESULTS AND DISCUSSION

1 – Soil physical properties: -

The effect of seedbed preparation on soil bulk density (ten days after the first irrigation and before wheat harvesting) at three depths (0 – 75, 75-150, 150-225 mm) was determined. The percentage of change in soil density (ΔP) was determined as the formula:

$$\Delta P = (p_1 - p_2)/ p_1 \times 100 \quad \text{---------- 9.}$$

Where: p_1 = Density of soil before tillage (1.62 g/cm^3)

p_2 = Density of soil after seed-bed preparation (g/cm^3)

The values of bulk density were shown in Fig. (1). In general rotary tiller caused the highest values of change in bulk density at the three depths under study. On the other hand, the chisel plow in two directions gave the lowest values at all depths.

Values of the percentage change in soil bulk density kept its trend to harvesting time Fig 2. This behavior may be due to the few times of irrigation required to grow wheat and to the ability of formed seedbed to maintain its structure. From Figs 1 and 2, it can be seen that the soil bulk density was decreased in all treatments after tillage, but the tillage method has its influence on decreasing value and the stability of aggregates of seedbed.

2-Soil porosity and void ratio: -

The obtained data demonstrated in Figs. 3 and 4 showed the effect of seed bed preparation at various working depth on soil porosity (p) and void ratio (n) after ten days from the first irrigation and before wheat harvesting. From the previous figs it could be seen that the porosity and void ratio decreased with increasing soil depth. The analyses of the obtained data showed that, there is a significant difference between soil porosity and

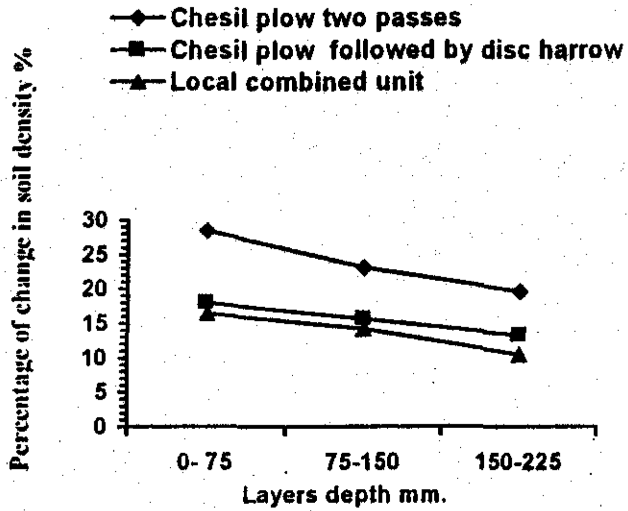

Fig 1

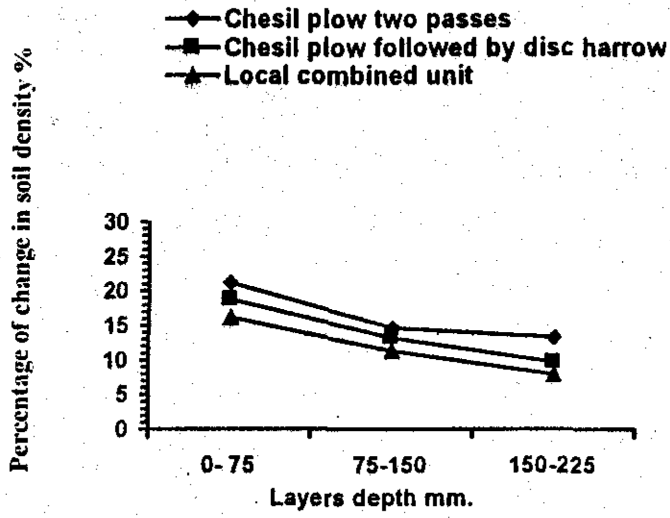

Fig 2

Fig (1 and 2) .Effect of layers depth level on soil bulk density percentage at various seedbed preparation methods (ten days before harvesting)

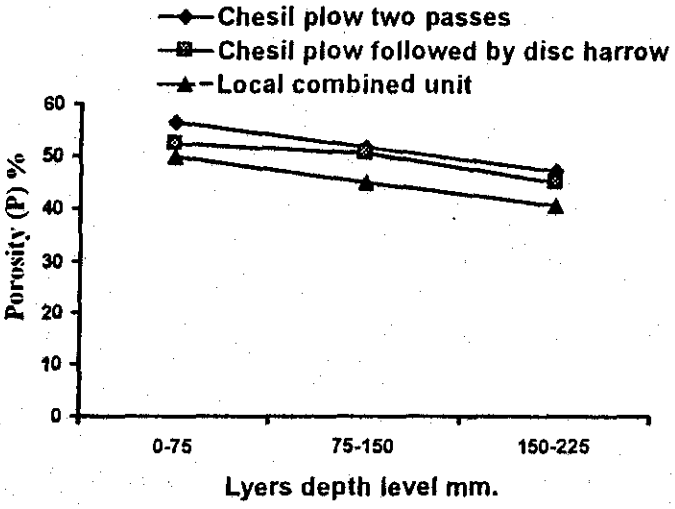

Fig. 3A- Effect of layers depth level on porosity At various seedbed preparation methods .

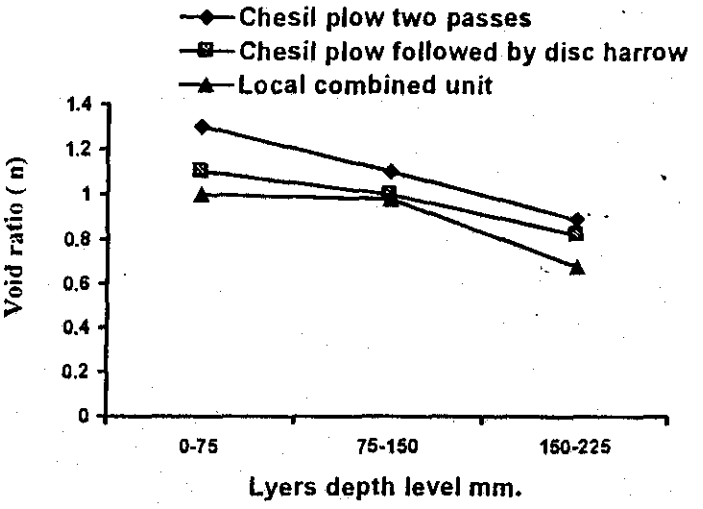

Fig. 3B- Effect of layers depth level on void ratio (n) at various seedbed preparation methods.

Fig. 3A and B : Effect of seedbed preparation on porosity (p) and void ratio (n) after ten days from first irrigation .

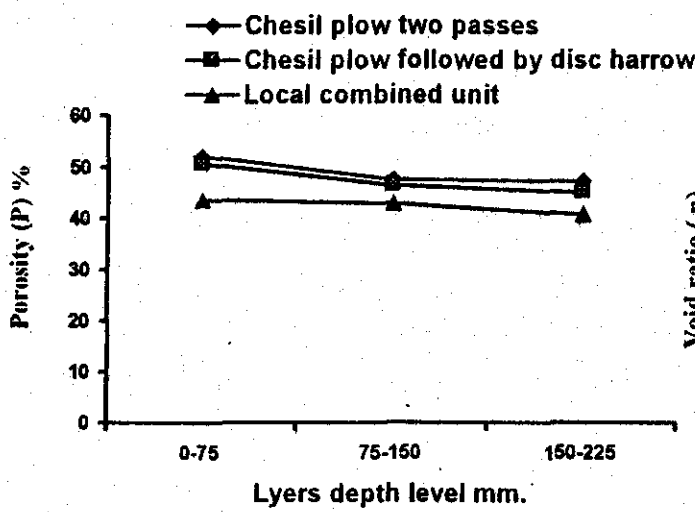

Fig.4A-Effect of layers depth level on porosity at various seedbed preparation methods before wheat harvesting

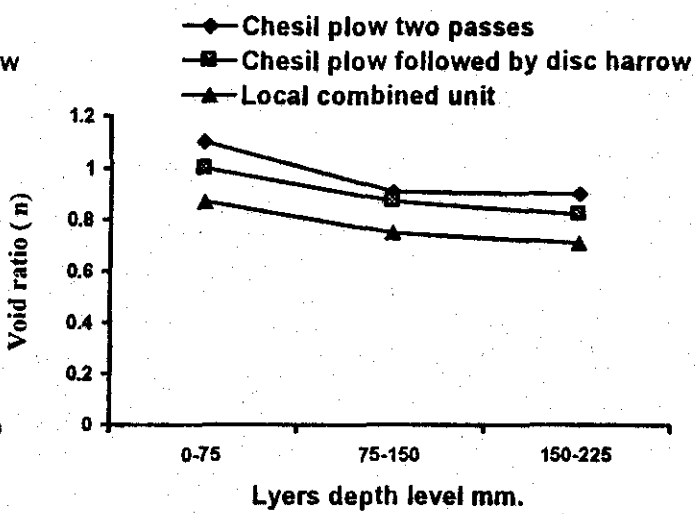

Fig.4A-Effect of layers depth level on void ratio at various seedbed preparation methods before wheat harvesting

Fig .4 A and B : Effect of seedbed preparation on porosity (p) and void ratio (n) before wheat harvesting

void ratio for different seed bed preparation systems under study. For example in all layers using chisel plow in two passes gave the highest values of (p) and (n). On the other hand, the lowest values were obtained with local combined unit. These results may be attributed to the action of local combined unit which gave high soil granulation than the other treatments

3- Soil clod diameter: -

Fig 5 shows the variation in each range < of clod size and soil mean weight diameter due to the different seedbed preparation systems under study.

The soil mean weight diameter for all seed-bed preparations under study were 38.86 mm. for chisel plow in two passes; 35.25mm. for chisel plow followed by disc harrow; and 25.10 mm. for combined unit.

The analysis of the obtained data indicate that there are significant differences between the mean weight diameter for all seed-bed preparation systems under study. It also can be seen that, using combination unit caused the lowest value of mean mass diameter but chisel plow caused the highest value.

4-The consumed energy (c.e.):

The machine performance for each seedbed preparation systems under study were evaluated. The parameters of machine performance were consumed fuel, the period of time to execute the unit area, the values of actual productivity and the consumed energy. Tables (1 and 2) shows that primary tillage required the highest energy among all agricultural operations.

The required energy for A, B, and C systems of seedbed preparation were 79.03, 79.03 and 52.06 kW/fed. for T_1, T_2 and T_3 respectively. Data showed that local combined unit gave the best results for consuming energy with all wheat cultivars.

As indicated in Table (2) The less power consumed was obtained with local combination unit (52.06 k.w/fed.),the obtained of means 2.27 and 2.32 kw/ardab for grain yield and 8.64 and 8.13 for straw yield in 1999/2000 and 2000/2001 respectively but the highest consumed power was obtained with chiseling two passes + leveling + drilling (79.03 kw/fed),this means 3.62 and 3.71 kw /ardab for grain yield and 14.72 and 14.58 for straw yield in 1999/2000 and 2000/2001 respectively ,followed by chiseling one pass + harrowing + leveling + drilling (79.03 kW /fed.) means 3.48 and 3.69for grain yield and 13.67 and 13.26 for straw yield in 1999/2000 and 2000 /2001 respectively.

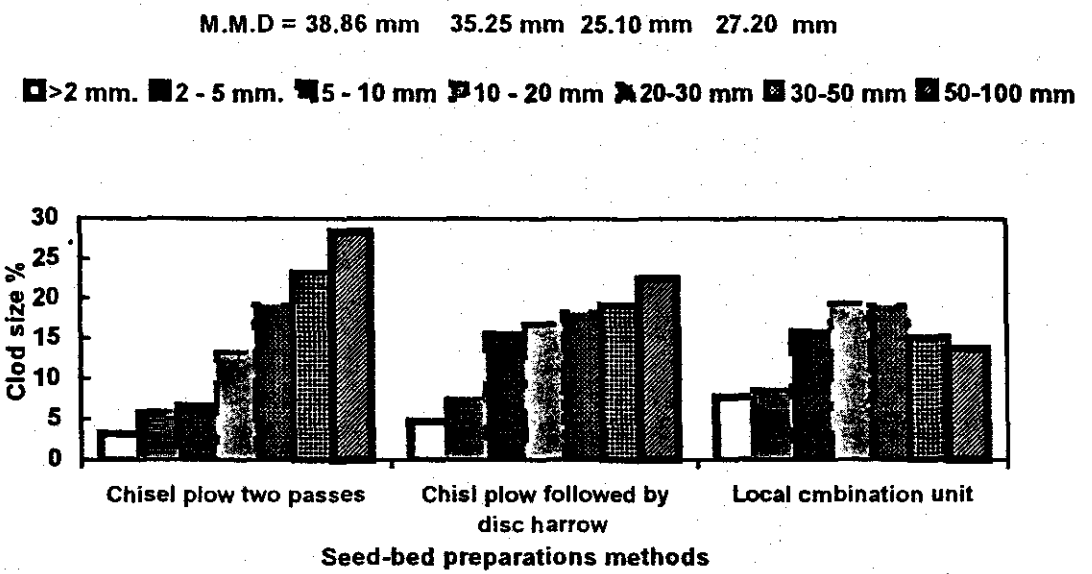

Fig 5: Clod size distributions and mean mass diameter for three seed- bed preparations systems

Table 1:The energy requirement for the different operations.

Operation	Effective productivity Fed/h	Consumed fuel, Lit /Fed	Total time S/Fed	Rate of fuel consumption, lit/sec	Required power KW	Energy req. kW/Fed
Chisel plow in the first pass	1.0	8.5	3600	0.00236	26.83	26.38
Chisel plow in the second pass	1.5	5.7	2400	0.00238	27.06	18.04
Disc harrow after chisel plow	1.5	5.7	2400	0.00238	27.06	18.04
Local combined unit	1.5	5.7	2400	0.00238	27.06	18.04
Seed drill	2.3	2.17	1562	0.00139	15.80	6.87
Leveling operation	1.0	8.8	3600	0.00244	27.74	27.74

Table 2 : The relation between the yield and consumed power

Operation	Energy req., KW/Fed	Grain yield/fed		Straw yield	
		1999/2000	2000/2001	1999/2000	2000/2001
Chisel plow in one pass + harrowing+ leveling	79.03	21.82	21.30	5.37	5.42
Local combined unit +leveling + drilling	52.65	23.23	22.73	6.09	6.47
Chisel plow in two pass + leveling +drilling	79.03	22.68	21.42	5.78	5.96

5- Yield and yield components :

A- Effect of cultivars ;

It is obvious from data in Tables 3 and 4 show that number of days to heading and number of days to maturity were significantly affected by cultivars. Giza 168 followed by Gemmiza 9 gave the highest number of days to heading and maturity , while Sakha 93 followed by Gemmiza 7 were earlier cultivars. These results might be due to the differences between studied cultivars on growth habit and response of each cultivar to environmental conditions controlled by the genetical factors. Similar results were obtained by El- Karamity and Salem (1993), El-Karamity (1998) and Salem (1999).The tallest plants at harvest time and greatest number of grains/spike, grain weight/spike and 1000- grain weight were recorded from Gemmeiza 7 cultivar while the highest values of number of spikes/m^2, straw yield and grain yield resulted from Gemmiza 9 followed by Gemmiza 7 cultvars. These results are in harmony with those obtained by El-Karamity (1998) and Salem (1999).

Data showed that yields of grain and straw were significantly affected by cultivars. It is important to note that Gemmeiza 9 surpassed the three cultivars in grain and straw yields/fed. This may be attributed to the differences among studied cultivars in yield attributes, especially number of spikes/m^2, plant height as well as seed index. The present findings are in agreement with several investigators among them Abd EL-Magied (1990), El-Karamity and Salem (1993), El-Karamity (1998) and Salem (1999).

Table (3) Effect of seed bed preparation methods ,seeding rate on the productivity of four newly wheat cultivars in 1999/2000season

Variables	Cultivars (V)				Sig	Seed bed preparation methods (T)			Sig	Seeding rate (S)			Sig	Interaction			
	Sakha 93	Gem. 7	Giza 168	Gem 9		T1	T2	T3		40	50	60		TxS	TxV	SxV	TxSxV
Days to heading	100.33d	102.36c	113.58a	103.08b	**	103.75b	105.54a	105.23a	**	105.35a	105.04a	104.13b	**	n.s	*	n.s	n.s
Days to maturity	144.50d	146.75c	160.69a	153.69b	**	151.13b	151.88a	151.23b	*	152.71a	152.46a	149.06b	**	n.s	*	**	n.s
Plant height	102.61d	114.27a	107.75c	112.36b	**	107.5b	110.37a	109.87a	**	107.15c	109.18b	111.41a	**	**	**	**	n.s
No of spikes/m^2	379.47b	381.64b	329.94c	408.19a	**	371.56b	378.35a	374.52ab	*	360.69c	374.73b	389.02a	**	n.s	n.s	**	n.s
No of grains/spike	50.06d	79.89a	59.08c	75.36b	**	64.48c	67.58a	66.23b	**	67.90a	66.33b	64.06c	**	*	n.s	n.s	n.s
Grain weight/spike	4.12b	4.54a	4.17ab	4.39ab	**	4.25n.s	4.35n.s	4.32n.s	*	4.90a	4.64a	3.38b	**	n.s	n.s	n.s	n.s
1000-grain weight	47.55bc	49.97a	47.01c	48.15b	**	47.71b	48.46a	48.43a	**	49.72a	47.50b	47.29b	**	**	n.s	n.s	n.s
Straw yield	5.56b	5.68ab	5.72ab	6.05a	**	5.37b	6.09a	5.78ab	**	5.16b	6.01a	6.10a	**	n.s	n.s	n.s	n.s
Grain yield	21.63b	21.90b	23.90a	23.71a	**	21.82c	23.23a	22.68b	**	21.11c	24.13a	22.50b	**	n.s	n.s	n.s	n.s

*, ** and n.s indicate P<0.05, P< 0.01 and not significant, respectively Mean designated by the same letter are not significantly different at 5% level according to Duncan's Multiple Range Test 1955.

Table (4) Effect of seed bed preparation methods ,seeding rate on the productivity of four newly wheat cultivars in 2000/2001 season

Variables	Cultivars (V)				Sig	Seed bed preparation methods (T)			Sig	Seeding rate (S)			Sig	Interaction			
	Sakha 93	Gem. 7	Giza 168	Gem 9		T1	T2	T3		40	50	60		TxS	TxV	SxV	TxSxV
Days to heading	101.83c	104.22b	115.11a	104.67b	**	105.42b	107.06a	106.90a	**	106.90a	106.56a	105.92b	**	**	*	n.s	n.s
Days to maturity	146.42d	148.72c	162.53a	155.56b	**	152.83b	153.92a	153.17b	*	154.54a	154.19a	151.19b	**	n.s	n.s	**	n.s
Plant height	105.98d	118.40a	111.09c	115.42b	**	110.28b	114.20a	113.69a	**	110.32c	113.08b	114.77a	**	**	**	**	**
No of spikes/m^2	404.72b	405.92a	352.64c	432.86a	**	396.69	402.08	398.33	n.s	383.50c	400.65b	412.96a	**	n.s	n.s	**	n.s
No of grains/spike	51.67d	81.56.a	61.69c	76.33b	**	66.25b	69.17a	68.02a	**	69.71a	67.94b	65.79c	**	n.s	n.s	*	n.s
Grain weight/spike	4.33b	4.64a	4.47ab	4.50ab	**	4.46	4.50	4.49	n.s	4.95a	4.85a	3.65b	**	n.s	n.s	n.s	n.s
1000-grain weight	48.79c	51.36a	48.62c	50.01b	**	49.22b	50.15a	49.71ab	**	50.98a	49.43b	48.68c	**	**	**	n.s	n.s
Straw yield	5.74b	6.12a	5.80b	6.16a	**	5.42b	6.47a	5.96ab	**	4.84b	6.44a	6.56a	**	n.s	n.s	*	n.s
Grain yield	20.74c	21.98b	21.63b	22.93a	**	21.30b	22.73a	21.42ab	**	19.84c	23.87a	21.75b	**	n.s	n.s	*	n.s

*, ** and n.s indicate P<0.05, P< 0.01 and not significant, respectively Mean designated by the same letter are not significantly different at 5% level according to Duncan's Multiple Range Test 1955.

B-Effect of Seed-bed preparation :

Number of days to heading , number of days to maturity, plant height at harvest , number of grains/ spike, number of spikes/m^2 as well as 1000- grain weight in both seasons were significantly increased under combination unit for seedbed preparation (chisel plow + rotary plow) compared with the use of chisel plow two passes and chisel plow one pass followed by disc harrow. Wheat grain and straw yields were significantly affected by tillage system in both seasons. Grain and straw yields gave the highest values under combined unit for seedbed preparation compared with the other two tillage systems (Tables 3 and 4). El- Said *et al* (1988), Doughlas *et al.*, (1994), Hammel (1989 and 1995) and Abdou (1996) came to similar results.

C- Effect of seeding rates :

Results of the two seasons Tables 3 and 4 declared that increasing seeding rate resulted in earlier plants with heaviest seed rate. Also, plants came to maturity early with increasing the seeding rate, whereas the lightest seed rate produced the latest mature plants. The tallest wheat plants and highest number of spikes/m^2 were produced with the heaviest seeding rate of 60 kg /fed. While, number of grains/ spike , grain weight / spike as well as 1000- grain weight were significantly decreased as the seeding rate increased from 40 to 60 kg seeds/ fed. These results might be due to the competition between individual plants and struggling for available nutrients in the surrounding area . These results are in a general agreement with those obtained by Mosalem (1993), Sabry *et al.*, (1994), Eissa *et al.*, (1995), Moussa (1995) and Sorour *et al.*, (1998).

Grain yield (ardab/fed.) and straw yield (ton /fed.)were significantly increased by increasing the seeding rate up to 50 kg seeds/fed. Increased seeding rate, in the present study resulted in a higher number of spikes per unit area that might offset the negative effects of the decrease in number of grains /spike, grain weight /spike and 1000- grain weight to a certain level .This might explain the increase in grain yield obtained upon increasing the seeding rate up to 50kg seeds/ fed. Similar results were reported by Sadek (1990), Compbell *et al.*, (1991), Tampkins *et al.*, (1991), Singh *et al.*, (1992), Mosalem (1993), Samara and Dhilln (1993), Sabry *et al* (1994), Moussa (1995), Mosalem (1997) and Sorour *et al.*, (1998).

In the same time , the increase in straw yield with increasing seeding rate might be explained on the basis of the increase in the number of plants per unit area at the higher seeding rates, which created severe competition for light. This would definitely stimulate elongation and tillering. Thus wheat plants produced high straw yield and this may explain the increase in straw yield. Sadek (1990), Singh *et al.*, (1992), Moussa (1995) and Sorour *et al.*, (1998) reported similar results.

B-4- Effect of the interactions:

In table 5 indicated the interaction between tillage system and seeding rate had a significant effect on plant height at harvest time and 1000- grain weight in both seasons ,number of days to heading in the second season and number of grains/ spike in the first season ,respectively.

The interaction between tillage system and cultivars in Table (6) indicated the significant effect on number of days to heading ,plant height at harvest time in both seasons and number of days to maturity in the first season and 1000- grain weight in the second season.

In Table (7) the interaction between seeding rate and cultivars had a significant effect on number of days to maturity plant height at harvest time and number of spikes / m^2 in both seasons. While, number of grains /spike ,grain and straw yields affected significantly by the interaction between seeding rate and cultivars in the second season, only.

The interaction between tillage system and seed rate and cultivars Table (8) revealed that the significant effect on plant height at harvest time in the second season ,and the highest value was produced with using combination unit for seedbed preperation with Gemmeiza 7 wheat cultivar under 50 or 60 kg seed /fed. which the difference between the two seed rate no rich the level of significance .

CONCLUSION

In conclusion the results of the present investigation indicated that the use of local combined unit for seedbed preparation (chisel plow + rotary plow) and sowing with the rate of 50 kg seeds/fed and Gemmeiza 9 wheat cultivar proved to be the most suitable treatments for the best crop production.

Table (5): Effect of interaction between tillage and seed rate on plant height, 1000-grain weight, number of days to heading and number of grains/spike.

Variable	Seed rate (S)	Tillage methods (T)					
		1999/2000			2000/2001		
		T1	T2	T3	T1	T2	T3
Plant height	S1	104.90c	108.43cd	108.11cd	106.16d	112.69bc	112.11c
	S2	107.63d	110.44b	109.48bc	111.54c	114.49ab	113.21bc
	S3	109.96b	112.24a	112.04a	113.13bc	115.43a	115.76a
1000-grain weight	S1	49.69ab	49.28b	50.20a	51.04a	50.89a	51.01a
	S2	45.97d	48.28c	48.26c	47.88e	50.60ab	49.80bc
	S3	47.48c	47.82c	46.56d	48.74de	48.98cd	48.33de
Heading date	S1	106.06b	107.31a	107.31a	---	---	---
	S2	106.13b	106.94ab	106.63ab	---	---	---
	S3	104.06c	106.94ab	106.75ab	---	---	---
Number of grains/spike	S1	65.44cd	70.00a	68.25b	---	---	---
	S2	64.50de	68.00b	66.50c	---	---	---
	S3	63.50e	64.75de	63.94e	---	---	---

Table (6): Effect of interaction between tillage and cultivars on heading date, plant height, maturity date and 1000-grain weight.

Variable	Cultivar(V)	Tillage methods (T)					
		1999/2000			2000/2001		
		T1	T2	T3	T1	T2	T3
Heading date	V1	98.83f	101.50c-e	100.67e	100.25e	102.67d	102.58d
	V2	101.08de	103.33b	102.67bc	103.17d	105.00b	104.50bc
	V3	113.17a	113.67a	113.92a	114.67a	115.33a	115.33a
	V4	101.92cd	103.67b	103.67b	103.58cd	105.25b	105.17b
Plant height	V1	101.98g	102.85g	102.99g	105.07h	106.17g	106.71g
	V2	111.64c	115.83a	115.33a	114.63d	120.94a	119.63b
	V3	105.86f	109.05e	108.34e	108.73f	112.68e	111.87e
	V4	110.50d	113.75b	112.83b	112.68e	117.02c	116.56c
Maturity date	V1	144.42fg	145.00f	144.08g	---	---	---
	V2	146.75e	146.67e	146.83e	---	---	---
	V3	159.67b	161.58a	160.83a	---	---	---
	V4	153.67cd	154.25c	153.17d	---	---	---
1000-grain weight	V1	---	---	---	47.90fg	49.02d-f	49.46c-e
	V2	---	---	---	51.49ab	51.90a	50.69a-c
	V3	---	---	---	47.58g	49.46c-e	48.83c-g
	V4	---	---	---	49.92c-e	50.24b-d	49.87c-e

Table (7): Effect of interaction between tillage and cultivars on maturity date , plant height , Number of spikes/m^2, Number of grains/spike, Straw yield and grain yield

Variable	Cultivar(V)	Tillage methods (T)					
		1999/2000			2000/2001		
		T1	T2	T3	T1	T2	T3
Maturity date	V1	145.67f	145.58f	142.25g	147.42f	147.25f	144.58g
	V2	147.67e	147.17e	145.42f	149.58e	149.08e	147.50f
	V3	162.92a	162.50a	156.67b	164.58a	164.25a	158.75b
	V4	154.58c	154.58c	151.92d	156.58c	156.17c	153.92d
Plant height	V1	101.72e	102.46de	103.65c-e	104.68j	106.00i	107.27h
	V2	111.50a-d	114.81ab	116.50a	115.01d	119.23b	120.98a
	V3	105.46b-e	107.14a-e	110.65a-e	108.51g	111.23f	113.53e
	V4	109.91a-e	112.33a-c	114.84ab	113.09e	115.87d	117.30c
Number of spikes/m^2	V1	367.5f	377.3de	393.7c	392.6e	404.1de	417.5c
	V2	369.4ef	380.6d	394.9c	394.3de	403.6de	419.8c
	V3	322.0h	330.8g	339.0g	341.3g	358.8f	357.8f
	V4	383.8d	410.3b	430.5a	405.8d	436.1b	456.7a
Number of grains/spike	V1	55.00h	50.92i	49.08j	---	---	---
	V2	82.75a	82.08a	79.83b	---	---	---
	V3	63.00f	62.17f	59.92g	---	---	---
	V4	78.08c	76.58d	74.33e	---	---	---
Straw yield	V1	4.61e	5.95d	6.64bc	---	---	---
	V2	5.04e	6.71a	6.58bc	---	---	---
	V3	4.34e	6.66a	6.37cd	---	---	---
	V4	5.37de	6.44b-d	6.66a	---	---	---
Grain yield	V1	19.11g	22.83b-d	20.28e	---	---	---
	V2	20.32e	24.00b	21.62d	---	---	
	V3	19.65f	23.78bc	21.46d	---	---	---
	V4	20.28e	24.87a	23.63bc	---	---	---

Table (8): Effect of interactions between tillage, seed rate and cultivars on plant height in 2000/2001 season.

Seed rate (S)	Cultivars (V)	Tillage methods (T)		
		T1	T2	T3
S1	V1	101.98o	105.41mn	106.43mn
	V2	108.80k	119.17bc	117.57c-e
	V3	105.16n	110.93j	109.23k
	V4	108.72k	115.25f-h	115.22f-h
S2	V1	106.8mn	106.51mn	105.21n
	V2	116.75ef	121.77a	119.67b
	V3	108.91k	112.61l	111.98ij
	V4	114.45gh	117.10de	115.97e-g
S3	V1	107.55lm	106.38mn	108.28kl
	V2	117.37c-e	122.40a	122.17a
	V3	112.53ij	114.31gh	114.18h
	V4	115.07gh	118.62b-d	118.40b-d

REFERENCES

Abd El-Magied , S.E.A. (1990).Effect of some agricultural practices on growth and yield of wheat M.Sc. Thesis,Dep.,of Agro.Fac. of Agric., Minia Univ., Egypt.

Abdel Mageed, H.N. and M.M. El Sheikha (1993).Evaluating an active – passive implement for the conservation tillage production on flax. Misr. J. Agric. Eng., 10 (2) 219-229.

Abdou, F.M. (1995).Effect of seedbed preparation systems and mechanical planting on wheat production. Misr. J. Agric. Eng., 13(1): 44-48

Abo-Habaga, M.M.(1992).Influnce of soil clods size distribution in seedbed prepration on applicability of a grain drill machine for wheat .Misr. ,J.Ag.Eng., 9 (1) :58- 66.

Bahnas, O. T.(1999).Evaluation of some farm machinery under the Egyptian conditions. ph. D.Thesis,Dep.of Mech., Faculty of Agric., Mansoura Univ.

Compbell , C.A.; F. Sells, R.P. Zentner and J.G.Mcleod (1991).Effect of seeding rate and depth on winter wheat grown on conventional fallow in S.W. Saskatchewan, Canda .Can. J.Plant Sci. 71(1):51-62

Douglas, L.L.; D.E.Wilkins and D.B.Churchill(1994).Tillage, seed size and seed density effects on performance of soft white winter wheat Agon. J. 86: 707- 711

Duncan,B.D.(1955). Multiple range and Multiple F.Test Biometrics,11:1-24

Eissa, A.M.; T.M. Shehab and A.M. Dawood (1995).Row- spacing and seeding rate effects on yield and yield components of spring wheat in Al-Qassim region , saudi arabia.Assiut J.of Agric. Sci. 26 (3): 25- 36

El-Karamity , A.E. and M.A. Salem (1993).Productivity of newly wheat varieties under different N fertilizer rates in newly reclaimed soils.Egypt J. Appl. Sci., 8(6):745- 763

El-Karamity, A.E. (1998).Response of some wheat cultivars to seeding and nitrogen fertilization ratesJ. Agric. Sci., Mansoura Univ., 23(2) : 643-655

El-Sahrigi, A. F. and M. M. Abou-Habaga (1993).Effect of seedbed preparation of some soil" FAUNA. 5th Int. Conf. on Mechanization and Energy in Agriculture 11-14 Oct. 1993 Kusadas, Tuekive.

El-Sahrigi,A.F.and E.Ghazy (1991).Direct seeding of rice in Egypt". Tentative report, A.M.R.I. Min. of Agric., Cairo:3-7 .

EL-Said, A.S.; A.A. Abd-El-Razek and M.M. El-Menoufi (1988).Effect of different tillage practices upon soil properties and wheat yield Misr J. Ag. Eng., 5(3): 282- 296

El Sheikha, M. A.(1989) .A quick and effective method to prepare seed-bed for Egyptian farms. Egyptian-German conf. Agric., Mansoura Egypt 4 -6 October, PP.104-114.

Esam, H.,(1997).Influence of precision system and planting method on barley yield ,5 th con. of Misr Society of Agric.Eng.9th sept.,J.Agric. Eng.,4 (4): 221-223.

Gomez, K.A.and A. A. Gomez (1984).Statistical procedures for Agricultural Research . An International Rice Research Institute Book.John Willy and Sons. Inc., New York.

Hakanssen, I. and Jozsel Von Polgar (1984).experiments on the effects of seedbed characteristics on seedling emergence in a dry weather situation Soil and Tillage Res.(Elsevier science publishers B. V., Amsterdam) 4:115-135.

Hammel, J.E. (1989).Long- term tillage and crop rotation effects on bulk density and soil impedance in northern IdahoSoil Sci. Soc. Am. J. 53: 515- 1519

Hammel, J.E. (1995)Long- term tillage and crop rotation effects on winter wheat production in northern Idaho Agron. J. 87: 16-22

Mosalem, M.E.(1993).Response of two wheat cultivars to nitrogen level and seeding rate . J. Agric. Res. Tanta Univ., 19 (4) : 791-805

Mosalem, M.E. (1997).Comparative study between methods of planting and nitrogen application under two tillage systems on wheat growth and yield J. Agric. Res. , Tanta Univ., 23(3): 310-321

Moussa, A.M. (1995)Some agronomic treatments on growth, yield and yield components of wheat M.SC. Thesis, Fac. of Agric., Tanta Univ., Egypt.

Rnan (1983).Test cods and procedures for farm machinery united rations development program technical series No.12

Sabry, S.R.S.; A.H. Abdel-Lateef and M. H. Iskandar (1994).The effect of row spacing and seeding rate on wheat (*Triticum aestivum* L.) grain yield under different environments of Egypt.Zagazig J. Agric. Res. 21(4): 1015-1021

Sadek , E.M. (1990)Effect of seeding rates and time of nitrogen application on growth , yield and quality of wheat .Ph.D. Thesis, Fac. of Agric., Cairo Univ.,Egypt.

Salem, M. A. M.(1999).Effect of sowing dates and seedind rates on productivity of three newly wheat cultivars(*Triticum aestivum* L.) J.Agric.Sci. Mansoura Univ.,24(9):4379 –4395.

Samara, J. S. and S. S. Dhillon (1993).Effect of seed rate and nitrogen level on new genotypes (PBW154 and PBW222) of wheat (Triticum aestivum L.)Indian J. Agron. 38 (1): 111- 112

Singh, R.V.; V.K. Dubey and M.D.Vyas (1992).Effect of seed rate , nitrogen level and method of fertilizer placement on wheat (*Triticum aestivum L.*)under late sown condition. Indian J. Agron.37(1): 43-46.

Sorour, F. A.;M.E. Mosalem; and A.E.,Khaffagy,(1998).Effect of preceding crop, seeding rates and nitrogen levels on wheat growth and yield and its components. J.Agric. Res., Tanta Univ., 24(3):263-281.

Tampkins, D.K.;D.B.Flower and A.I. Wright (1991).Water use by no-till winter wheat influence of seed rate and row spacing.Agon. J.83(4):766-769.

المراجع العربية

عبده،ف.م.أ (١٩٩٥)تصميم وحدة مجمعة لتمهيد مرقد البذرة والزراعة فى سطور تناسب محاصيل القمح والارز والشعير .

Mis.J.Ag.Eng.,12 (3) 601-623.

عبده،ف.م.أ (١٩٩٥)تصميم وحدة مجمعة لتمهيد مرقد البذرة تناسب خدمة محاصيل القمح والارز والشعير Misr J. Ag.Eng.,12 (3) 624-648

الملخص العربى

استجابة الأصناف الجديدة للقمح لطرق إعداد مرقد البذرة ومعدل التقاوي

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يعتبر إنتاج الغذاء هو التحدي الرئيسي للتخطيط المصري ولذلك نفذت هذه التجارب خلال موسمي ١٩٩٩/٢٠٠٠،٢٠٠٠ / ٢٠٠١ فى محطة البحوث الزراعية بالجميزة- محافظة الغربية بغرض تقييم تأثير طرق إعداد مرقد البذرة على إنتاجية بعض أصناف القمح الجديدة للحصول على الحزم التكنولوجية لكل صنف. واستخدمت ثلاث طرق لاعداد مرقد البذرة وهى:محراث حفار وجهين،وحدة مجمعة محلية لاعداد مرقد البذرة(محراث حفار+محراث دورانى)،محراث حفار وجه واحد+مشط قرصي.واستخدمت أيضا ثلاث معدلات

للتقاوي هي: ٤٠ ، ٥٠ ، ٦٠ كجم حبوب/ للفدان وأربعة أصناف من القمح هي:سخا ٩٣، جميزة ٧، جيزة ١٦٨ وجميزة ٩وقد أوضحت النتائج الآتى:-

كان لاستخدام وحدة مجمعة محلية لاعداد مرقد البذرة (محراث حفار+محراث دوراني) تأثير معنوي على صفات التزهير، والنضج، وطول النبات، وعدد ووزن حبوب السنبلة ووزن الألف حبة وعدد السنابل/م^2 قياسا بالطرق الأخرى لاعداد مرقد البذرة. وأيضا تفوقت الوحدة المجمعة المحلية لاعداد مرقد البذرة على الطرق الأخرى فى صفتي محصول الحبوب والقش للفدان.أدت زيادة معدلات التقاوي من ٤٠الى٦٠ كجم حبوب/ للفدان الى التبكير فى التزهير والنضج وكذلك الى الحصول على أطول النباتات وأعلى القيم لعدد السنابل/م^2 بينما أدت الى تناقص عدد حبوب السنبلة،وزن حبوب السنبلة،وزن الألف حبة معنويا. وأدت زيادة معدلات التقاوى حتى ٥٠ كجم/ فدان الى زيادة محصول الحبوب والقش للفدان. تفوق الصنف جميزة ٧ على الأصناف الأخرى فى صفات طول النبات ،عدد الحبوب/للسنبلة ،وزن حبوب السنبلة،وزن الألف حبة بينما تفوق الصنف جميزة ٩ على الأصناف الأخرى فى صفات عدد السنابل/م^2 ومحصول الحبوب والقش.

كان التفاعل بين طرق إعداد مهد البذرة ومعدلات التقاوي معنوي لصفات طول النبات ووزن الألف حبة فى كلا الموسمين وصفتي التزهير وعدد حبوب السنبلة فى الموسم الأول. وكان التفاعل بين الأصناف وطرق اعداد مرقد البذرة معنوى لصفات التزهير والنضج وطول النبات فى كلا الموسمين ووزن الألف حبة فى الموسم الثانى . وكان التفاعل بين الأصناف ومعدلات التقاوي معنوي لصفات النضج وطول النبات وعدد السنابل/م^2 فى كلا الموسمين وعدد حبوب السنبلة ومحصول الحبوب والقش فى الموسم الثانى فقط. وكان التفاعل الثلاثى بين طرق إعداد مرقد البذرة والأصناف ومعدلات التقاوي معنوي لصفة طول النبات فى الموسم الثاني.