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EFFECT OF SEEDING RATE AND NITROGEN LEVEL ON THE PRODUCTIVITY OF MEXIPAK 65 WHEAT CULTIVAR

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ABSTRACT

Two field experiments were conducted at Al-Oha Wheat State Farm, Department of Agriculture and Livestock, Al-Ain, United Arab Emirates, during two successive seasons of 1996/1997 and 1997/1998 to study the effect of four seeding rates (90, 120, 150 and 180 kg seeds / ha) as well as four nitrogen levels (80, 120, 160 and 200 kg N / ha) on the productivity of the most popular wheat cultivar in the region, i.e. Mexipak 65. The result obtained could be summarized as follows:

1- Varying seeding rate did not affect the grain yield in both seasons.

2- All the characters in this study were not affected by the different seeding rate except number of spikes / m^2, number of grains / spike and spike weight in the second season when the lowest seed rate i.e. 90 kg seeds / ha. gave the highest number of grains / spike and the heaviest spike grain weight and the lowest number of spikes / m^2.

3- The effect of nitrogen was pronounced spike length, number of spikelets / spike, flag leaf area, plant height, number of spikes / m^2, number of grains / spike and spike grain weight were favourably influenced by the increase of nitrogen level. However, 1000-grain weight decreased only in the second season when the level of nitrogen increased more than 120 kg N / ha.

4- Grain yield significantly increased by increasing nitrogen level up to 160 kg and 200 kg N / ha. in the first and second seasons, respectively.

INTRODUCTION

As in many plants, the production of the individual wheat plants is controlled by the competition for light, nutrients, moisture, ... etc. The magnitude of competition is in turn determined by the distribution of the plants in unit area. The total production of a crop is determined by the number of plants in unit area on one hand and the production of the individual plant on the other hand. Accordingly, the seed rate plays an important role in determining the yield of crop.

Regarding the effects of seeding rate, Saleh (1981) and El-Shaarawy (1998) recorded decrease in spike length, number of spikelets / spike and flag area by increasing seeding rate. However, Gabr (1988) reported the insignificant effect of different seeding rate on flag leaf area. plant high increased by increasing seeding rate. This view was reported by El-Ghareib and El-Menoufi (1988), Gabr (1988), Abou-Warda (1993) and Mosalem (1993). However, Saleh (1981) recorded decrease in plant height with increase the rate of seed and in the same time El-Shaarawy (1998) found that plant height did not change by various seeding rates.

Number of spikes / m^2 increased with increasing seeding rate. This view was reported by Saleh (1981), Hagras (1985), Gabr (1988), Mahmoud (1988) and El-Shaarawy (1998). Number of grains / spike and spike grain weight decreased by increasing seeding rate. This was recorded by Saleh

(1981), El-Gharieb and El-Menoufi (1988), Gabr (1988), Abou-Warda (1993), Mosalem (1993) and El-Shaarawy (1998).

Regarding the effect of seeding rate on 1000 - grain weight, different trends were reported, Saleh (1981), Gomaa (1983), El-Ghareib and El-Menoufi (1988), Mahmoud (1988), Kumar *et al*. (1991), Abou-Warda (1993), Mosalem (1993) and El-Shaarawy (1998). recorded decreases of 1000 - grain weight with increasing seeding rate. However, Hegazi *et al.* (1982), Samra and Dhillan (1987), Gabr (1988) and Megahed (1991) found that 1000 - grain weight was not affected by varying seeding rate.

Grain yield increased by increasing seed rate up to 150 kg seeds / ha. This was recorded by Sharaan *et al.* (1986). Some workers found increase in grain yield with increasing seed rate up to 170 - 180 kg seeds / ha. Among them, Hagras (1985), Abd El-Latif and El-Tuhamy (1986), Mahmoud (1988), Abou-Warda (1993), Mosalem (1993) and El-Shaarawy (1998). Pall *et al.* (1987) and El-Ghareib and Menoufi (1988) obtained the highest grain yield by increasing seed rate up to 240 kg and 190 kg seeds / ha., respectively. Same workers obtained the highest grain yield with increasing seed rate more than 250 kg / ha. Among them, Samra and Dhillan (1987), Kumar *et al.* (1991) and Singh *et al.* (1992). However, Gabr (1988) obtained higher grain yield from lower seed treatment, i.e. 95 kg seeds / ha. compared with grain yield obtained by higher seed rate i.e. 170 kg seeds / ha.

Lastly, the insignificant effect of the different seeding rate on grain yield was reported by Saleh (1981), Gomaa (1983) and Megahed (1991).

Regarding the effect of nitrogen level Saleh (1981), Gabr (1988), Abou-Warda (1993) and El-Shaarawy (1998) recorded increases in spike length, number of spikelets/spike, flag leaf area and plant height with increasing nitrogen level.

Number of spikes / m^2, number of grains / spike, and spike weight increased with increasing nitrogen level. This view was reported by Saleh (1981), Megahed (1991), Abou-Warda (1993), Darwiche (1994), Abd El-Zaher (1997) and El-Shaarawy (1998).

Concerning 1000 - grain weight, same workers recorded increases in 1000 - grain weight with the increase in nitrogen level. Among them Gabr (1988), Abou-Warda (1993), Mosalem (1993) and Abd El-Zaher (1997). Other workers recorded decreases in grain 1000 - grain weight with increasing nitrogen levels. Among them Abd El-Aleem (1980), Saleh (1981), Hegazi *et al.* (1982), Megahed (1991), Ismail and Shehab El-Din (1992), Darwiche (1994) and El-Shaarawy (1998). However, El-Shami *et al.* (1995) indicated that 1000 - grain weight was not affected by the different nitrogen levels.

Different response were recorded in nitrogen levels to produce the highest grain yield. Same investigator recorded increases in grain yield with increasing level up to 160 - 180 kg N / ha, among them Abd El-Aleem (1980), Hussein *et al.* (1981), Gabr (1988), Sadek (1990), and Megahed (1991). While Sharaan *et al*. (1986) and Abou El-Nagah (1991) recorded response up to 214 kg N/ha. Moreover, Hegazi *et al.* (1982), Mosalem (1993)

and Darwiche (1994) recorded increases in grain yield up to 238 kg N / ha. Same workers recorded increases in grain yield due to increasing nitrogen level more than 250 kg N / ha. Among them Abd El-Latif and El-Tuhamy (1986), Singh *et al.* (1992), Ismail and Shehab El-Din (1992), Al-Abdul Salam *et al.* (1993), Abd El-Zaher (1997) and El-Shaarawy (1998).

Therefore, this study was performed in order to determine an optimum seeding rate with optimum nitrogen level for Maxipak 65 wheat cultivar.

MATERIALS AND METHODS

This study was carried out at Al-Oha Wheat State Farm, Department of Agriculture and Livestock, Al-Ain, United Arab Emirates, during two successive seasons 1996/1997 and 1997/1998 to study the effect of four seeding rates as well as four nitrogen levels on the productivity of Mexipak 65 wheat cultivar.

1- Seeding rate:

1- 90 kg seeds / ha. 2- 120 kg seeds / ha.
3- 150 kg seeds / ha. 4- 180 kg seeds / ha.

2- Nitrogen level :

1- 80 kg N / ha. 2- 120 kg N / ha.
3- 160 kg N / ha. 4- 200 kg N / ha.

Mechanical and chemical analysis of the experimental soil.

	1996/1997		1997/1998	
	0 - 20	20 - 40	0 - 20	20 - 40
Mechanical analysis				
Coarse sand %	0.3	0.5	2.1	2.8
Fine sand %	99.3	99.2	97.6	96.9
Silt %	0.3	0.2	0.2	0.2
Clay %	0.1	0.1	0.1	0.1
Chemical analysis				
Available N ppm	58	59	56	58
Available P ppm	22	17	18	14
K - Exchangeable ppm	76	44	80	42
$CaCo_3$ %	31	32	31	30
E.C. (m. mhos)	2.24	2.37	2.56	2.48
pH	8.0	8.05	7.97	8.0

The split plot design with four replications was followed. The four seed rates were randomly distributed in the main plots while the four nitrogen levels were distributed at random in the sub - plots. The area of the sub - plot was 2 m x 3 m including 10 rows 3 m length and 20 cm apart. Seeds / row was 5.4, 7.2, 9.0 and 10.8 grams for the seeding rate 90, 120, 150 and 180 kg seeds / ha, respectively. The amount of nitrogen as urea 46 % N from each nitrogen level was divided into five equal doses, the first dose was applied at planting, while the others four doses were applied by 14 days interval. Phosphate and potassium fertilizers were applied in the rate of 90 kg P_2O_5 and 75 kg K_2O / ha. before sowing. Sprinkler irrigation system was used. About 60 irrigations were applied during each season (600 mm). The salinity of irrigation water was 1200 ppm in both seasons. Planting date was 14 and 16 of November in the first and second season, respectively.

At milk ripe stage flag leaf area was determined using the method suggested by Lal and Subba Rao (1951).

Harvesting took place at physiological maturity and harvest date was 18 and 12 April in the first and second season, respectively. Harvested area was 2.4 m^2 (4 inner rows x 3 m length and 20 cm apart).

At harvest, the following characters were measured.

1- Plant height (cm).
2- Spike length (cm).
3- Number of spikelets / spike.
4- Number of spikes / spike.
5- Number of grains / spike.
6- Spike grain weight (gm).
7- 1000 - grain weight (gm).
8- Grain yield (ton / ha).

The data obtained were statistically analysed according to procedures outlined by Snedecor and Cochran (1967) and the treatment means were compared by least Significant Difference (L.S.D) at 5 % level.

RESULTS AND DISCUSSION

The effect of seeding rate and nitrogen level on grain yield and its components as well as other agronomic characters are shown in Tables (1) and (2).

1- Effect of seeding rate:

Data presented in Table (1) showed the insignificant effect of the different seed rates on spike length, number of spikelets / spike, flag leaf area and plant height in both seasons. Gabr (1988) recorded the insignificant effect of the different seeding rate on the area of flag leaf while El-Shaarawy (1998) reported the insignificant effect of seeding rate on plant height.

Data presented in Table (2) indicated that various seed rates were affected number of spikes / m^2, number of grains / spike grain weight in the second season only. Ninety kilograms of seeds / ha. gave the highest number of grains / spike and the heaviest grain weight / spike while the highest rate of seeds i.e. 180 kg seeds / ha. gave the highest number of spikes / m^2. These results are in harmony with those obtained by Saleh (1981), Gabr (1988) and El-Shaarawy (1998).

Thousand grain weight was not affected by the different rates in both seasons and this was reported by Hegazi *et al.* (1982), Samra and Dhillon (1987), Gabr (1988) and Megahed (1991).

Seeding rate did not affect grain yield / ha. in both seasons as shown in Table (2). The insignificant effect of seed rate on grain yield in the first season may be due to the insignificant effect of seed rate on all yield components characters. However, in the second season, the increase in number of spikes / m^2 due to the increases in seed rate was met by decreases in number of grains / spike and spike grain weight, consequently the grain yield was not affected. These results agreed with those obtained by Saleh (1981), Gomaa (1983) and Megahed (1991).

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2- Effect of nitrogen level:

Data in Table (1) showed that increasing nitrogen level up to 160 kg N/ha caused a significant increase in spike length, number of spikelets / spike, flag leaf area and plant height, except number of spikelets / spike in the first season and flag leaf area in the second seasons which responded up to 120 kg N / ha. only. These results are in agreement with those of Saleh (1981), Gabr (1988), Abou Warda (1993) and El-Shaarawy (1998).

Regarding the effect of nitrogen level up to 200 kg N/ha on yield components, data in Table (2) indicated that, increasing nitrogen level caused significant increase in number of spikes / m^2, number of grains / spike and spike grain weight. These results are in harmony with those obtained by Saleh (1981), Gabr (1988) and Megahed (1991).

Thousand grain weight showed decreases with any increase in nitrogen level. However, the significant decrease in 1000 - grain weight was obtained in the second season only when nitrogen level increased from 80 to 160 or to 200 kg N / ha. The reduction in 1000 - grain weight due to increasing nitrogen level reported by Saleh (1981), Megahed (1991), Ismail and Shehab El-Din (1992) and El-Shaarawy (1998). While the insignificant effect of nitrogen levels on 1000 - grain weight was reported by El-Shami *et al.* (1995).

Grain yield responded to the increases in nitrogen level in both seasons. In the first season, increasing nitrogen level from 80 to 120 kg N / ha. or from 120 to 160 kg N / ha. was accompanied with significant increase in grain yield. In the second season, increasing nitrogen level from 80 to 120 kg N / ha. gave significant increase in grain yield. However increasing nitrogen from 120 to 160 kg N / ha. increased grain yield, but this increase was not significant. Incremental nitrogen level to 200 kg N / ha. caused significant increase in grain yield. These results are in agreement with those obtained by Abd El-Aleem (1980), Gabr (1988), Sadek (1990) and Megahed (1991) which they recorded significant increases in grain yield by increasing nitrogen level to 160 - 180 kg N / ha., meanwhile Sharaan *et al*. (1986) and Abu El-Nagah (1991) recorded response up to 214 kg N / ha.

3- Effect of the interaction between seed rates and nitrogen levels:

The effect of the interaction between the seeding rates and nitrogen levels in this study was not significant on all the characters studied.

REFERENCES

Abd El-Aleem, M.M.M. (1980). Effect of some seeding methods and nitrogen fertilization on growth and yield of same wheat varieties. M. Sc. Thesis, Fac. of Agric. Cairo Univ., Egypt.

Abd El-Latif, L.I. and M.K. El-Tuhamy (1986). Effect of nitrogen fertilization level and seeding rates on growth and yield of wheat. Annals Agric. Sci., Fac. of Agric., Ain Shams Univ., Egypt.

Abd El-Zaher, S.R. (1997). Wheat productivity as affected by fertilizer: nitrogen levels and sources. M. Sc. Thesis, Fac. of Agric. Cairo Univ., Egypt.

Abou-Warda, A.M.A. (1993). The response of wheat to some cultural practices under reclaimed area. Ph.D. Thesis, Fac. of Agric. Zagazig Univ., Egypt.

Abd El-Nagah, M.M. (1991). Effect of some agricultural practices on wheat. M. Sc. Thesis, Fac. of Agric. Mansoura Univ., Egypt.

Al-Abdul salam, M.A.; O.A. Al-Tahir; A.A. Al-Jasim and H.O. Burhan (1993). Wheat growth as influenced by the interaction of drainage water and nitrogen fertilization. Expel. Agric., 29 : 195 - 200 .

Darwiche, A.A. (1994). Agricultural studies on wheat. Ph. D. Thesis, Fac. of Agric. Zagazig Univ., Egypt.

El-Ghareib, E.A. and M.M. El-Menoufi (1988). Effect of seeding rates and nitrogen fertilization levels on the productivity of Giza 157 Egyptian wheat cultivar. Annals Agric. sci., Fac. of Agric. Ain Shams Univ., Cairo, Egypt.

El-Shaarawy, G.A.M. (1998). Effect of some agricultural treatments on growth and yield of some new wheat varieties. M. Sc. Thesis, Fac. of Agric. Al-Azhar Univ., Egypt.

El-Shami, M.M.; M.S. Sharshar and A.H. Abdel-Latif (1995). Effect of late planting date and nitrogen fertilization on wheat. Egypt, J. Appl. Sci., 10 (9): 177 - 188.

Gabr, E.M.A. (1988). Effect of seed rate and nitrogen application on wheat yield. Ph. D. Thesis, Fac. of Agric. Zagazig Univ., Egypt.

Gomaa, M.A. (1983): Studies on some factors affecting yield of some wheat varieties. Ph. D. Thesis, Fac. of Agric. Zagazig Univ., Egypt.

Hagras, A.M. (1985). Influence of seed rates and nitrogen fertilization on yield of darum wheat. Annals Agric. sci., Fac. of Agric. Ain Shams Univ., 30 (2): 929 - 949.

Hegazi, K.F.; E.H. Ghanem; A.M.A.S. Ali and E.S. Shokr (1982): The effect of seeding rate and nitrogen application on the yield and its components of the wheat variety Giza 157. Annals Agric. sci., Fac. of Agric. Moshtohor, 18: 1 - 13.

Hussein, M.A.; A. Kandil El-Sayed Shokr and M.M. Abd El-Aleem (1981). Effect of seeding method and nitrogen fertilizer on some agronomic character of Giza 157 and Sakha 8 wheat cultivars (*Triticum aestrivum,* L.).

Ismail, S.M. and T.M. Shehab El-Din (1992). Wheat yield response to watre and nitrogen under sprinkler irrigation. Misr J. Ag. Eng. 9 (4) : 617 - 623.

Kumar, A.; A.K. Sinha and B.P. Sinha (1991). Response of wheat genotypes to seed rates and row spacing. Indian J. Agron., 36 (1) : 78 - 82.

Lal, K.N. and M.S. Subba Rao (1951). A rapid method of leaf area determination. Nature, 167:72 .

Mahmoud, K. (1988). Study on some agricultural factors affecting growth yield, yield componants and technological characteristics of wheat. Ph. D. Thesis, Fac. of Agric. Minia Univ., Egypt.

Megahed, M.A.M. (1991). Effect of some agricultural treatments on wheat. Ph. D. Thesis, Fac. of Agric. Zagazig Univ., Egypt.

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

Pall, G.P.; R.K. Shukla; S.K. Dubey and R.S. Sharma (1987). Response of wheat to nitrogen and seed rates under rainfed condition. Indian J. Agron., 32 (4): 330 - 334.

Sadek, E.M.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.

Saleh, M.E.E. (1981). Productivity and floral fertility of wheat plant as affected by some agronomic treatments. Ph. D. Thesis, Fac. of Agric. Zagazig Univ., Egypt.

Samra, J.S. and S.S. Dihllan (1987). Response of wheat varieties to seed rates and nitrogen. Indian J. Agron., 32 (2): 167 - 169.

Sharaan, Samia, A.N.; M.M. Hassan; A.M. Mohamed and P.M. Ismail (1986). The productivity of some wheat varieties in relation to seed rate and nitrogen application level. Egypt, Annals of Agric. Sci., Zagazig Univ., 24 (2): 667 - 681.

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 swon condition. Indian J. Agron., 37 (1): 43 - 46.

Snedecor, G.W. and W.G. Cochran (1967). Statistical methods, Sixth Edition. Iowa State Univ. Pres. Ames. Iowa. USA.

تأثير معدل التقاوى ومستوى التسميد الأزوتى على انتاجية صنف القمح مكسباك 65

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خبير الشئون الزراعية ـ دائرة الزراعة والثروة الحيوانية بالعين ـ دولة الإمارات العربية المتحدة

أقيمت تجربتان حقليتان خلال الموسمين 1997/96 و1998/97 بمشروع انتاج القمح بالعوهة ـ دائرة الزراعة والثروة الحيوانية بالعين ـ دولة الإمارات العربية المتحدة وذلك بهدف دراسة تأثير معدلات التقاوى المختلفة (90، 120، 150، 180 كجم تقاوى للهكتار) وكذلك مستويات التسميد الأزوتى (90، 120، 160، 200 كجم ن للهكتار) على انتاجية صنف القمح مكسباك 65 والذى يزرع فى أكثر من 40 % من المساحات المخصصة لزراعة محصول القمح بمنطقة العين بدولة الإمارات العربية المتحدة .

ولقد أوضحت النتائج أن معدلات التقاوى المختلفة التى استخدمت فى هذه الدراسة لم يكن لها تأثير معنوى على محصول الحبوب بينما كان لمستويات التسميد الأزوتى تأثير مرغوب ومعنوى على محصول الحبوب وجميع الصفات التى شملت الدراسة عدا وزن الألف حبة ولقد كانت أفضل النتائج معنويا عند 160 كجم أزوت للهكتار فى الموسم الأول وعند 200 كجم أزوت للهكتار فى الموسم الثانى .

Table (1) Effect of seeding rate and nitrogen level on some agronomic characters of Mexipack 65 wheat cultivar during 1996/997 and 1997/98 seasons.

Characters / Treatments	Spike length cm		Number of spikelets/spike		Flag leaf area cm^2		Plant height cm	
	96/97	97/98	96/97	97/98	96/97	97/98	96/97	97/98
A - Seeding rate:								
90 kg seeds / ha.	10.1	8.3	15.7	13.7	45.3	39.4	80.2	77.1
120 kg seeds / ha.	10.0	8.3	15.7	13.6	44.5	39.6	86.9	79.3
150 kg seeds / ha.	9.9	8.0	15.2	13.1	44.9	39.2	87.8	77.9
180 kg seeds / ha.	9.5	8.1	14.4	13.1	42.1	39.4	85.4	78.2
F - test	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
L.S.D at 5 %	---	---	---	---	---	---	---	---
B- Nitrogen level:								
80 kg N / ha.	9.4 a	7.7 a	14.7 a	12.6 a	36.7 a	35.4 a	83.3 a	76.3 a
120 kg N / ha.	9.9 b	7.9 ab	15.3 b	12.9 ab	42.0 b	40.0 b	87.1 b	77.2 ab
160 kg N / ha.	10.2 c	8.2 bc	15.5 b	13.3 bc	47.7 c	41.0 b	88.1 bc	78.9 bc
200 kg N / ha.	10.2 c	8.5 c	15.5 b	13.6 c	50.4 c	41.2 b	89.8 c	80.5 c
F - test	**	**	**	**	**	**	**	**
L.S.D at 5 %	0.3	0.4	0.6	0.6	3.8	3.6	2.5	2.6
Interactions:	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

Table (2) Effect of seeding rate and nitrogen level on grain yield and its components of Mexipack 65 wheat cultivar during 1996/997 and 1997/98 seasons.

Characters / Treatments	1000-grain weight (gm)		Spike grain weight (gm)		Number of grains/spike		Number of spikes/m^2		Grain yield ton/ha	
	96/97	97/98	96/97	97/98	96/97	97/98	96/97	97/98	96/97	97/98
A – Seeding rate:										
90 kg seeds / ha.	5.84	4.70	381	355 a	50.2	46.4 c	1.88	1.60 b	37.5	34.6
120 kg seeds / ha.	5.83	4.79	407	376 ab	48.3	44.8 bc	1.79	1.57 b	37.4	35.1
150 kg seeds / ha.	5.86	4.91	408	405 bc	47.8	41.6 ab	1.77	1.47 a	36.2	35.3
180 kg seeds / ha.	5.70	5.03	457	423 c	45.7	40.4 a	1.68	1.42 a	36.7	35.3
F - test	N.S	N.S	N.S	**	N.S	**	N.S	**	N.S	N.S
L.S.D at 5 %	---	---	---	35	---	3.4	---	0.08	---	---
B- Nitrogen level:										
80 kg N / ha.	4.92 a	4.27 a	351 a	359 a	43.6 a	40.2 a	1.64 a	1.45 a	37.6	35.8 b
120 kg N / ha.	5.88 b	4.79 b	405 b	383 ab	46.6 b	40.8 a	1.73 ab	1.44 a	37.1	355 ab
160 kg N / ha.	6.13 c	4.98 b	432 c	397 bc	50.2 c	45.9 b	1.84 bc	1.56 b	36.8	34.8 a
200 kg N / ha.	6.33 c	5.38 c	465 d	420 c	51.5 c	46.2 b	1.87 c	1.61 b	36.3	34.2 a
F - test	**	**	**	**	**	**	**	**	N.S	**
L.S.D at 5 %	0.25	0.27	23	36	2.6	2.5	0.11	0.10	---	1.0
Interactions:	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S