

Response Of Some Wheat Cultivars To Nitrogen Fertilizer Levels And Seeding Rates At Sharkia Governorate.1. Agronomic Characteristics

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ABSTRACT

A field experiments was conducted during 2022/2023 and 2023/2024 of growing seasons to investigate the effect of the effect of three levels of nitrogen fertilization (60, 90 and 120 Kg N/fed.) and three seeding rates (30, 60 and 90 Kg /fed.) on some agronomy characteristics and grain yield/fed. on some wheat cultivars.

The results did not show any significant differences between the two studied cultivars in the traits of plant height No. of days to heading, leaf area, dry weight, plant and spike length in both seasons and their combined data.

Nitrogen fertilizer had a significant effect on the trait of plant height in both seasons and combined analysis of data. Meanwhile, did not affect significantly of the traits of leaf area/plant and dry weight/plant. Increasing seeding rate from 30 to 90 Kg/fed had a significant effect on all studied traits during studied seasons and combined data.

Conclusively, for increasing the wheat yield in the area of Sharkia Governorate for the two wheat cultivars used in this study it is necessary to use nitrogen fertilizer levels at 120 kg N/fed. and 90 Kg seeds/fed.

Key words: Wheat cultivars - Nitrogen fertilizer levels - Seeding rates – agronomic characters.

INTROUDUCTION

Wheat (*Triticum aestivum* L.) is one of the most important major cereal crop all over the world, as well as in Egypt. It is used as staple food for more than one third of the world population (Abd Allah and El-Gammaal, 2009). It is consumed in many forms such as bread, cakes, biscuits, bakery products, and many confectionery products. Its straw is used as animal feed and also for manufacturing paper. In Egypt the quantity of wheat grain production must be

increased to cover the local consumption. The annual consumption of wheat in Egypt is about 16.0 million tons, while the annual local production is about 9 million tons (Ministry of Egyptian Agriculture, 2022). Efforts of scientists to minimize the gap between local production and consumption are directed towards two ways, i.e. expanding the cultivated wheat area and increasing the wheat productivity from the land unit area by selecting the high yielding varieties and balanced fertilization.

Nitrogen plays a vital role in increasing the yield of the crop. Application of proper amount of nitrogen is considered key to increase the yield of Wheat. Seeding rates is one of the important production factors. High wheat grain yield with better quality requires appropriate seeding rate for different cultivars. Increase in seeding rate above optimum level may only enhance production cost without any increase in grain yield (Soomro *et al.*, 2009). The optimum seed rates for wheat alter with variety, location and method of planting". "Wheat sowing at higher seed rate produced greater plant height" and also "higher yield attributes such as grains/spike, grains weight/spike, 1000 grain weight and number of effective tillers. (Kumar *et al.* 2002).

MATERIALS AND METHODS

Two field experiments were conducted during 2022/2023 and 2023/2024 of growing seasons in an extension field at Abo-Sharabia Village, Sharkia Governorate, Egypt to determine the optimum seeding rate for two wheat cultivars viz. Giza 171 and Masr144 from three seeding rates (30, 60 and 90 kg /fed..) as well as nitrogen fertilization levels.

Experiments were planted on November 7th and November 15th in the first and second seasons, respectively. The soil of the experimental sites was clay in texture with pH of 8.38 and containing 556.7 ppm (means of the two seasons for the upper 30 cm of soil depth). Nitrogen fertilization (Urea 46%N) was applied as a treatment at a rate of 60, 90 and 120 kg N/fed/ in three equal portions, the first was applied at a sowing, the second prior to the first irrigation and the third before the second irrigation.

A split split plot design with three replications was used. Wheat cultivars; Giza 171 and Masr 144 occupied the main plots, while nitrogen rates were arranged in the subplots and seeding rates arranged in the sub-sub-plot. Each sub sub-plot consisted of 15 rows; 3.5 m long and 20 cm in width (plot area = $3.5 \times 3 = 10.5$ m²). Wheat grains were drilled in rows. Surface irrigation and other agronomic practices were adopted as usually done by the local growers.

At flowering, heading date was recorded as the period from sowing till 50% spike emergence. At harvest time, ten fertile plant were randomly taken from the second inner row of each sub sub-plot to determine plant height (cm), dry weight plant, spike length (cm), and leaf area per plant.

During the growing season and at harvest, data were recorded on ten guarded plants from each entry as follows:

- 1- Plant height, PH (cm): plant height was measured from soil surface to the tip of the spikes, excluding owns.
- 2- Number of days to 50% heading
- 3- Leaf area/plant (cm²)
- 4- Dry weight/plant (g)
- 5- Spike length cm

Data of both seasons were significantly analyzed according to Snedecor and Cochran (1980). For comparison between means,

Duncan's multiple range test was applied (Duncan, 1955). Means followed by the same alphabetical letter (s) are not significantly different at the 0.05 level of significant. The combined data of the most agronomic characters were subjected to analyses.

RESULTS AND DISCUSSION

1- Plant height

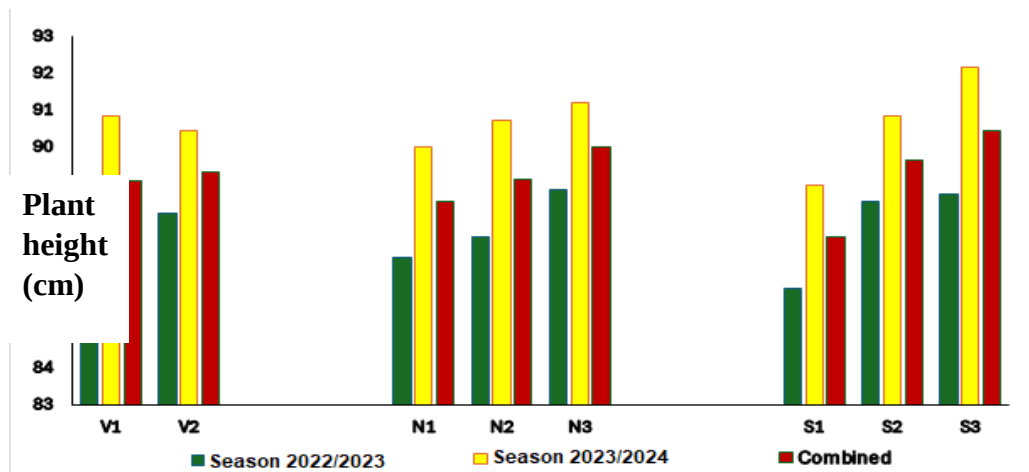
The statistical analysis of variance showed that the main studied factors, *i.e.* cultivars, did not show any significant had effect of plant height on the two studied seasons of 2022/2023, 2023-2024 and combined data.

Data in Table (1) and Figure (1) showed that no significant differences between the two varieties viz. Giza 171 and Maser 3 in the two studied seasons and their combined data. These results are harmony with those obtained by , Javid *et al.* (2012), El-Seidy *et al.* (2017) and Omnya *et al.* (2022).

On the other hand plant height had significantly affected by increasing the dose of nitrogen in the first and second seasons - and the combined data. These results are in harmony with concerning the effect of seed rates 60, 90 and 120 kg N/fed. On the average of plant height, the obtained results indicate that plant height as , affected by seeding rate in the both studied seasons and its combined data which show that plant height increased by increasing the seeding rate from 30 kg /fed. to 90 kg/fed. These results are in harmony with those obtained by Javid *et al.* (2012), Naman *et al.* (2024), Omnya *et al.* (2022) and Kelemu *et al.* (2024).

Table (1): The effect of wheat cultivars, nitrogen fertilizer levels and seeding rates on plant height (cm).

Items	Season		Combined data
	2022/2023	2023/2024	
<u>Cultivars:</u>			
Giza 171	107.019 a	98.74 a	102.8 a
Maser 3	108.7 a	98.03 a	103.3 a
F. test	N. S	N. S	N. S
<u>Nitrogen level: (kg/fed..)</u>			
60	105.00 b	97.88 b	101.44 b
90	108.00 a	98.3 a	103.15 ab
120	110.63 a	98.9 a	104.76 a
F. test	*	*	*
<u>Seeding rate: (kg/fed..)</u>			
30	102.4 c	95.6 c	99.00 c
60	107.7 b	98.7 b	103.2 b
90	113.5 a	100.8 a	107.15 a
F. test	*	*	*
<u>Interaction:</u>			
A x b	*	*	N. S
A x C	N. S	N. S	N. S
B x C	N. S	N. S	N. S
A x B x C	N. S	N. S	N. S

**Figure (1):** Plant height (cm)

The interaction of cultivars X nitrogen levels X seeding rate not affected significantly on plant height in both seasons and its combined data except the interaction between cultivars and nitrogen levels on both studied seasons.

2- Numbers of days to 50% heading

The mean squares of the statistical analysis for the data of this trait in Table (2) and Figure (2) indicated that it was not significantly affected the main studied of factors, i.e. wheat cultivars, in the two growing seasons and its combined data, except that nitrogen fertilization levels in both seasons and seeding rates and combined analysis showed that the 50% days from sowing to heading increased by increasing the rate of seeds in unit area.

The averages of number of days to 50% heading was affected by the two studied cultivars, and did not show and significant effect in two studied growing seasons and its combined. These results are harmony with Omnya *et al.* (2022) and Naman *et al.* (2024).

Same results obtained concerning the effect of nitrogen levels on this trait which revealed that significant by effects for nitrogen levels on this traits in both seasons and their combined data which the results a showed significant differences between the three levels of nitrogen used in this study.

Also, the results showed that seeding rate had a significant effect on number of days to 50% heading in both seasons and the combined data. This results agree with those obtained by Arian *et al.* (2022), Birhanu *et al.* (2021) and Chebrolu *et al.* (2022).

Data in Table (2) indicated that on significant interactions effect between the studied treatment in both growing seasons and its combined data except only between wheat cultivars and nitrogen levels in the second season only.

3-Leaf area per plant

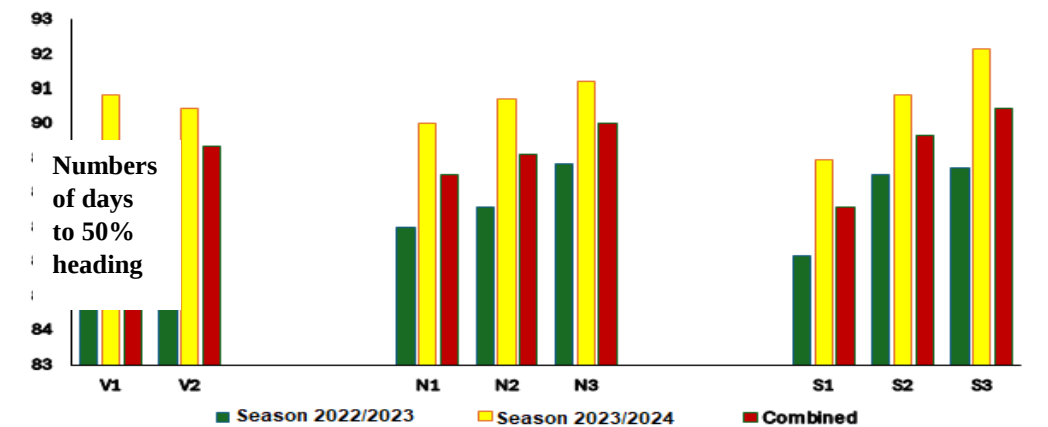
The mean squares of the statistical analysis for the data of this trait in Table (3) indicated that it was not significantly affected by the main studied factors in the two growing seasons and its combined analysis of data except the effect of seeding rates in the first season and combined data which had significant effect on leaf area (cm²).

Wheat cultivars did not affect also the average of leaf area per plant in both studied seasons and its combined analysis of data and was true at the different studied factors.

Similarly no significant effect found for nitrogen fertilization levels on leaf area/ plant in the two growing seasons and its combined analysis data.

Table (2): The effect of, nitrogen fertilizer levels and seeding rate on number of days to 50% heading of wheat cultivars

Items	Season		Combined data
	2022/2023	2023/2024	
<u>Cultivars:</u>			
Giza 171	87.3 a	90.85 a	89.07 a
Maser 3	88.2 a	90.44 a	89.32 a
F. test	N. S	N. S	N. S
<u>Nitrogen level: (kg/fed..)</u>			
60	87.00 b	90.00 b	88.5 c
90	87.55 b	90.72 b	89.13 b
120	88.83 a	91.22 a	90.02 a
F. test	*	*	*
<u>Seeding rate: (kg/fed..)</u>			
30	86.16 b	88.94 c	87.55 b
60	88.50 a	90.83 b	89.66 ab
90	88.72 a	92.16 a	90.44 a
F. test	*	*	*
<u>Interaction:</u>			
A x b	N. S	N. S	N. S
A x C	N. S	N. S	N. S
B x C	N. S	N. S	N. S
A x B x C	N. S	N. S	N. S

**Figure (2):** Numbers of days to 50% heading

On the other hand, seeding rate had a significant effect on leaf area/plant except of the second seasons. The data showed increasing seeding rates from 60, to 120 kg /fed.

It is clearly evident that neither wheat cultivars or nitrogen fertilization levels did not exert any significant effects on leaf area/plant. This might be attributed to that this character is a varietal one which is less affected by the environmental factors. Data are harmony with those obtained by Omnya *et al.* (2022) and Naman *et al.* (2024).

Table (3): The effect of nitrogen fertilizer levels and seeding rate on leaf area (cm²) with wheat cultivars

Items	Season Years		Combined data
	2022/2023	2023/2024	
<u>Cultivars:</u>			
Giza 171	25.01 a	23.16 a	24.08 a
Maser 3	25.04 a	23.28 a	24.16 a
F. test	N. S	N. S	N. S
<u>Nitrogen level: (kg/fed..)</u>			
60	24.88 a	23.12 a	24.00 a
90	24.94 a	23.21 a	24.07 a
120	25.25 a	23.32 a	24.28 a
F. test	N. S	N. S	N. S
<u>Seeding rate: (kg/fed..)</u>			
30	23.67 b	22.33 a	23.00 c
60	25.13 ab	23.35 a	24.24 b
90	26.27 a	23.97 a	25.12 a
F. test	*	N. S	*
<u>Interaction:</u>			
A x b	N. S	*	N. S
A x C	N. S	N. S	N. S
B x C	N. S	*	N. S
A x B x C	*	N. S	N. S

4-Dry weight/ plant:

The statistical analysis of variance indicated that wheat cultivars and nitrogen fertilization treatments in both studied seasons and its combined data did not affect this trait significantly except with seeding rates only (Table 4 and Figure a). Also the different interactions among this factors were not significant as shown in Table (4).

Seed rate had significant effect on the trait of dry weight/plant in both studied season, which increased the dry weight/plant by gradually increasing the rate of seeds/plant.

Table (4): The effect of wheat cultivars, nitrogen fertilizer levels and seeding rate on dry weight/plant (gm.).of -wheat cultivars

Items	Season		Combined data
	22/2023	2023/2024	
<u>Cultivars:</u>			
Giza 171	23.25 a	22.70 a	22.97 a
Maser 3	23.59 a	22.77 a	23.18 a
F. test	N. S	N. S	N. S
<u>Nitrogen level: (kg/fed..)</u>			
60	23.16 a	22.72 a	22.94 a
90	23.38 a	22.72 a	23.05 a
120	23.72 a	22.77 a	23.24 a
F. test	N. S	N. S	N. S
<u>Seeding rate: (kg/fed..)</u>			
30	22.77 b	22.00 b	22.38 b
60	23.44 ab	22.83 ab	23.13 ab
90	24.05 a	23.38 a	23.71 a
F. test	*	*	*
<u>Interaction:</u>			
A x b	N. S	*	N. S
A x C	N. S	N. S	N. S
B x C	N. S	N. S	N. S
A x B x C	N. S	N. S	N. S

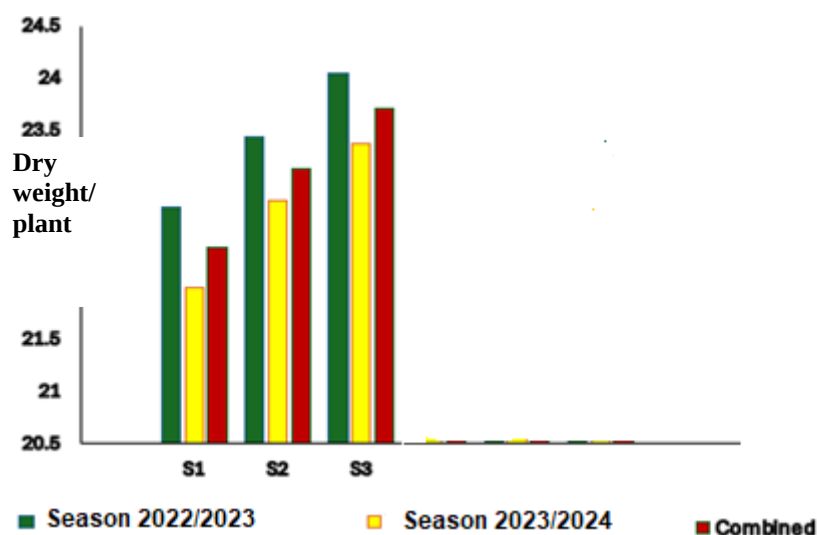


Figure (4): Effect of seeding rates on dry weight/ plant

All interaction effect between studied factors were not had any significant differences in both growing seasons and its combined analysis data except the interaction between wheat cultivars and nitrogen levels fertilization these results are in a good line with Javid *et al.* (2012) and Omnya (2022)

5- Spike length:

The statistical analysis of variance for date of this character indicated that no any significant differences between the two studied cultivars viz. Giza 171 and Masr 3 the two studied seasons and its combined data in Table (5).

Table (5) include the averages of spike length as affected by the three nitrogen fertilization levels in the first season only which showed that increasing N level from 60, to 120 kg N/fed. increased the length of spike and these results are general agreement with Javid *et al.* (2012) and Omnya *et al.* (2022).

On the other hand, seeding rates had a significant differences on the trait of spike in both seasons and its combined data and length of spike was increased by increasing the rate of seed/rad. (Table 5 and Figure 5) That was hold true at the two studied seasons.

Table (5): The effect of, nitrogen fertilizer levels and seeding rate on spike length (cm). of wheat cultivars

Items	Season		Combined data
	2022/2023	2023/2024	
<u>Cultivars:</u>			
Giza 171	13.90 a	12.77 a	13.33 a
Maser 3	14.01 a	12.90 a	13.45 a
F. test	N. S	N. S	N. S
<u>Nitrogen level: (kg/fed..)</u>			
60	13.61 b	12.80 a	13.20 a
90	13.77 ab	12.80 a	13.28 a
120	14.48 a	12.91 a	13.69 a
F. test	*	N. S	N. S
<u>Seeding rate: (kg/fed..)</u>			
30	13.19 c	11.88 c	12.53 c
60	13.96 b	12.86 b	13.41 b
90	14.72 a	13.77 a	14.24 a
F. test	*	*	*
<u>Interaction:</u>			
A x b	*	N. S	N. S
A x C	N. S	N. S	N. S
B x C	N. S	N. S	N. S
A x B x C	N. S	N. S	N. S

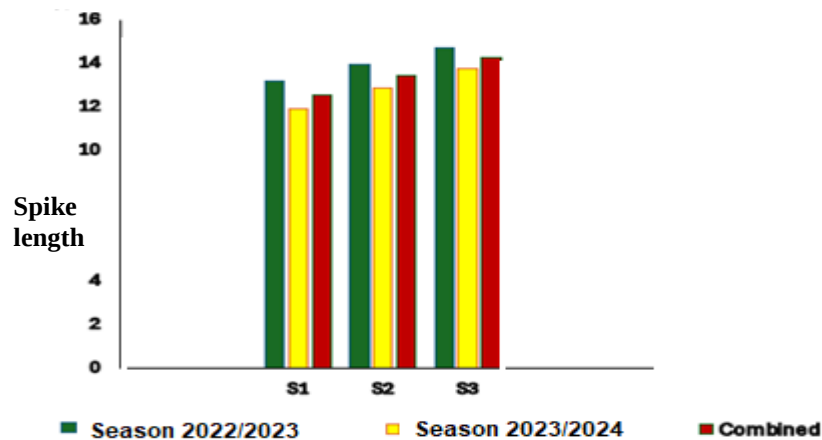
**Figure (5):** Effect of seeding rats on spike length of wheat plant

Table (5) indicate also that the interactions of N levels X cultivars X seeding rates and N levels X seeding rate did not exert any significant effect on this trait in both growing seasons except the interaction between cultivars and N levels in the first season only. These results are in harmony Javaid *et al.* (2012) and Omnya *et al.* (2022) reported that the interaction between seeding rates and nitrogen levels was non-significant for plant height number of tillers/m², spike length, No. of spikeletes/spike and 1000 grain weight.

Conclusively, to increase wheat yield in the Sharkia Governorate area for the two cultivars used in this study it is necessary to apply nitrogen fertilizer at rate of 120 kg/ fed and to use 90 kg seeds / fed

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استجابة بعض أصناف القمح لمعدلات السماد النتروجيني ومعدلات التقاوي في محافظة الشرقية . أ- الصفات الزراعية

منى محمد عيسوي، السيد السيد حسن، على عبد الحميد حسان، السيد بيومي جاب الله
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اقيمت تجربتان حقليتان في موسمي ٢٠٢٢/٢٠٢٣ ، ٢٠٢٣/٢٠٢٤ لدراسة تأثير التسميد النتروجيني بمعدلات ٦٠، ٩٠، ١٢٠ كجم/ف وكذلك تأثير معدلات التقاوي ٣٠، ٦٠، ٩٠ كجم/ف على صنفين من القمح وهم جيزة ١٧١، مصر ٣ وذلك في مزارع بقرية أبو شرايبة مركز كفر صقر محافظة الشرقية وكان التصميم التجريبي المتبع هو القطع المنشقة مرتين وأخذت القرارات التالية:

- ١- ارتفاع النبات ٢- عدد الأيام حتى طرد السنابل ٥٠% ٣- مساحة ورقة العلم
- ٤- الوزن الجاف للنبات ٥- طول السنبل.

وكانت أهم النتائج هي:

النتائج لم تظهر تأثير معنوي بين صنفى الدراسة فيما يخص ارتفاع النبات وعدد الأيام للطرْد ومساحة الورقة والورق الجاف فى النبات فى كل من موسمي الزراعة. زيادة التسميد النيتروجينى أدت إلى زيادة فى ارتفاع النبات فى كلا الموسمين فى حين لم تؤدى إلى زيادة معنوية فى مساحة الورقة للنبات والعدد الجاف للنبات. بزيادة معدل التقاوى من ٣٠ – ٩٠ كجم/فدان أدى إلى زيادة معنوية فى جميع الصفات المدروسة ما عدا عدد الأيام اللازمة لطرْد السنبلَة ومساحة الورقة وعدد السنابل /م^٢ فى تحليل التباين المشترك للموسمين. فى أغلب الأحوال التفاعل بين الأصناف ومعدلات التسميد الأزوتى ومعدلات التقاوى لم تصل إلى مستوى المعنوية فى كلا الموسمين. **التوصية:** على وجه العموم يمكن التوصية باستخدام معدلات تسميد تصل إلى ١٢٠ كجم/ف فى محافظة الشرقية من أجل زيادة محصول الفدان من الحبوب والزراعة بمعدل التقاوى يصل إلى ٩٠ كجم حبوب للفدان فى كلا من الصنفان.