EFFECTS OF PLANTING METHODS AND NITROGEN FERTILIZATION RATES ON THE PRODUCTIVITY OF SOME WHEAT VARIETIES

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ABSTRACT

A field experiment was conducted during two consecutive seasons of 2017/2018 and 2018/2019 in Agricultural Farm of Sids Agricultural Research Station, ARC, Beni-Suef Governorate, Egypt. The experiment aims to compare the effects of some planting methods (flat, ridges and raised bed) and wheat varieties, i.e., Misr 2 and Sids 14 under different nitrogen fertilization rates (0.0, 120 and 180 kg ha^{-1}) and its effect on wheat crop growth parameters, yield and yield components and nutrient status of wheat (Triticum aestivium L.). The design of the experiment was split-split plot in completely randomized blocks in four replicates. The results expressed that Misr 2 surpassed Sids 14 variety on growth parameters, yield and its components and N, P and K uptake, except number of spikes m^{-2}. Raised bed method exhibited the highest values of growth parameters, yield and yield components and NPK uptake, except 1000-grain weight. Increasing nitrogen fertilizer rates up to 180 kg ha^{-1} were significantly increased all studied growth parameters, yield and its components as well as nutrient content and uptake. The results of the interaction between treatment show that cultivation Misr 2 variety on raised bed under application of 180 kg N ha^{-1} gave highest wheat productivity.

Key words: Wheat, varieties, planting methods, nitrogen fertilization, growth parameters, yield and yield components and nutrient status.

INTRODUCTION

Wheat is the most world three important cereal crops beside rice and maize, where it has the more distribution of the other cereal crop. In Egypt, wheat is the main winter crop for grains and straw production. Grains are the main source of human feed and the straw is the main source of fodder for animal feeding. The policy of our country aims to improve production to meet the increasing demand of local consumption. It can be increased the total annual wheat production by increasing wheat area, introducing high yielding varieties and improving the agricultural practices such as fertilization and planting methods **(Morsy et al, 1999)**.

Evaluation of wheat varieties for yield and its components enables the breeder to have sufficient information of variety performance under various environmental conditions and cultural practices such as planting methods. In Egypt, many workers stated the variability of wheat varieties in wheat productivity, such as **Abdel-Majeed (1990)** who reported that Giza 157 variety gave highest wheat productivity than other studied varieties, **Mahmoud and Ismail (1997)** stated that Sids 5 varieties surpassed other varieties in vegetative growth and grain yield and **Sarhan and Abd El-Hamed (2018)** found that Sids 12 variety gave the greatest number of

spikes m^{-2} and number of grains $spike^{-1}$, while Beni-Suef 5 variety exhibited the greatest values of plant height, 1000-grain weight, grain and straw yields as well as N, P and K content in grains and straw.

Bed planting methods have been used in agricultural for centuries **(Ghane et al, 2009)**. It is a new methods in farming system in Egypt. **Sayre (2004)** mentioned that the raised-bed system has traditionally been related to water efficiency, either by supplied opportunities to reduce the impact of excess water. He added that more than 95% of the farmers acceptance of this method for wheat and other some crops such as cotton, maize, soybean……etc. This method has some advantages for wheat, e.g., ease in water management, minimizing the risk of water-logging and plant lodging, reducing the rate of seeding, better nutrient fertilizers and herbicides due to the changing socio-economic environment in Egypt, which reflected in shortage and further escalating labor costs. Accordingly, raised bed methods required less labor, water, fertilizers…etc. can be used without sacrificing crop productivity **(Hobbs et al, 2000 and Hossain et al, 2006)**.

Nitrogen fertilizer is among the important factors which contribute largely to the performance of cereal crops. Wheat varieties largely differ in their response to nitrogen, therefor proper management and the adoption of suitable varieties would help in monitoring the soil fertility besides higher crop yield **(Mahmoud and Ismail, 1997)**. Many investigators stated the response of wheat varieties to nitrogen levels such as **Galal (2007)**, **Ali et al (2009)** and **Ismail et al (2015)**.

The information concerning this methods is inadequate in Egypt. Therefore, the present study has been performed to investigate the suitable planting methods and optimal nitrogen dose under different wheat varieties to maximizing the wheat productivity with minimizing the total costs.

MATERIALS AND METHODS

Two field experiments were undertaken at Sids Agricultural Research Station, ARC, Beni-Suef Governorate, Egypt (Latitude: 29° 04 N, Longitude: 31° 05 E) and at an elevation of 30:40 m above sea level in 2017/2018 and 2018/2019 seasons. The soil of experimental area in both seasons is clay, slightly alkaline in reaction (soil pH: 7.96 and 7.83), low in salinity (1.02 and 1.15, dSm), low in organic matter (1.6 and 1.8%) and having soil available N, P and K of 22.1 and 24.3, 15.1 and 16.6, and 176 and 181 ugg^{-1} in the two seasons respectively (according to **A.O.A.C, 1٩٨٦**). The experiments were carried out as split-split Plot in completely randomized block design. The planting methods (flat, ridges and raised bed) were devoted in main plots and cultivars (Sids 14 and Misr 2) were located in sub plots, while nitrogen levels (0.0, 120 and 180 kg N ha^{-1}) were arranged in sub-sub plots. The sub-sub plots for flat method consisted of 3.5 m length with 15 rows $plot^{-1}$, 20 cm apart (10.5 m^2). On the other hand, the raised bed method plot consisted of three beds, bed spacing was 100 cm, center-to-center, and 3.5 m long) each bed consisted of five rows 20 cm apart). Seed rates of 140 kg ha^{-1}, 165 kg ha^{-1} and 105 kg ha^{-1}

were used in flat planting, broadcasting and raised bed treatments, respectively in 15 and 31 November in both seasons, respectively. Nitrogen fertilizer treatments as ammonium nitrate (33.5% N) in two equal doses as side dressed before first and second irrigations. All other cultural practices were applied as recommended for wheat production at district. At 75 days age ten plants were taken to measure some growth parameters, such as plant height and dry weight plant^{-1}; at harvest, ten plants were randomly taken for each sub-sub plots to determine some yield components, i.e., number of spikes m^{-2}, number of grains spike^{-1} and 1000-grain weight as well grain and straw yield. Also, N, P and K content in both grains and straw were determined (according to **Chapman and Pratt, 1961**) and converted to N, P and K uptake.

The data collected were statistically analyzed using analysis of variance procedure according to **Gomez and Gomez (1993)**. Means were compared using Duncan Multiple Range Test (DMRT) at 5% level of probability.

RESULTS AND DISCUSSION

Vegetative growth:

Data of the effect of planting methods, nitrogen levels of two wheat varieties on vegetative growth at 75 days age (heading stage) are given in **Table 1**. With respect to the main effect of planting methods, the results show that planting methods was found to be significant on growth parameters at heading stage. Plant height and dry weight plant^{-1} were highest in the raised bed method followed by ridges, while flat method appeared the lowest ones. The superiority of the raised bed method on wheat vegetative growth than other planting methods may be attributed to this method reduce the impact of excess water or to more efficiently deliver irrigation water **(Sayre, 2004)**. In addition, **Hobbs et al (2000)** reported that bed method led to improve water distribution and fertilizers efficiency and reduce weed control and plant lodging. These results agree with those obtained by **Hossain et al (2006)**.

As for the main effect of wheat varieties, the data indicate that Sids 14 variety had the tallest plant and heaviest dry weight than Misr 2. The variation in wheat growth parameters of the two studied varieties may be due to its genetic make up as well as the mode of utilization of metabolic products **(Abd El-Ghany et al, 2013)**. Similar results were obtained by **Ahmed et al (2011)** and **Sarhan and Abd El-Hamed (2018)** who stated that wheat varieties differed in its vegetative growth at heading stage.

Respecting the main effect of nitrogen, the data reveal that nitrogen levels were significantly affected all studied wheat growth parameters.

Table 1. Effect of planting methods and nitrogen levels on growth parameters at 75 days age under some varieties.

Main effect of planting methods (A)

Planting methods	Plant height (cm)		Dry weight plant-1 (g)	
	1st season	2nd season	1st season	2nd season
Flat	106.55[c]	104.85[c]	2.04[c]	1.96[c]
Ridges	108.58[b]	107.63[b]	2.14[b]	2.05[b]
Raised bed	109.98[a]	109.30[a]	2.20[a]	2.15[a]

Main effect of varieties (B)

Sids 14	109.28[a]	107.98[a]	2.21[a]	2.13[a]
Misr 2	107.47[b]	106.54[b]	2.04[b]	1.97[b]

- Main effect of nitrogen levels (kg ha^{-1}) (C)

0.0	96.2[c]	95.03[c]	1.80[c]	1.74[c]
120	113.7[b]	112.55[b]	2.20[b]	2.13[b]
180	115.2[a]	114.20[a]	2.39[a]	2.29[a]

Interaction	N.S	N.S	N.S	N.S

"Means having same letter not significantly differ level of probability"

Nitrogen level at 180 kg ha^{-1} exhibited the highest and heaviest plants. The beneficial effect of nitrogen on enhancing wheat growth is mainly due to nitrogen is an essential nutrient in building the plant dry matter as well as many energy-rich compounds which regulate photosynthesis **(Wankhade and Kene, 1990,** and **Guhe and Sagave, 1992)**. These results are similar to those obtained by **Limon et al (2000)** and **Ali et al (2009)**.

As for the interaction, the data show that wheat growth parameters did not affected by the interaction between the studied treatments. In general, the highest values of growth parameters at heading stage were recorded for Misr 2 when planted in raised bed and fertilized with 180 kg N ha^{-1}, while the lowest ones were exerted for Sids 14 when planted in flat method without nitrogen fertilization.

Yield components:

The data in **Table 2** show the effect of planting methods and nitrogen levels for some wheat varieties on yield components of wheat. As for varieties, the data show that wheat variety had a pronounced effect only on number of grain spike^{-1}, while number of spikes m^{-2} and 1000 grain weight did not affect. The highest value of number of grains spike was obtained from the variety Misr 2. The differentiation of wheat varieties on number of grains spike may be due to the genetic structure of the variely primarily affected by heredity. These results are in harmony with those obtained by **Kilic (2010)** and **Sarhan and Abd El-Hamed (2018)** who stated that

wheat varieties differ in its yield components. The results indicate that planting methods had a significant effect on wheat yield components, except 1000-grain weight. It could be arranged these effects on number of spikes m^{-2} and number of grain spike in the descending order as follow: raised bed > ridges > flat methods. The positive effect of raised bed method on yield components than the other to methods is mainly due to its effect on wheat growth parameters as discussed before. Raised bed method increased number of spikes m^{-2} and number of grains spike over flat method by about 4.0 and 13.7% in the first season, and 3.7 and 11.5% in the second one, respectively. These results are in line with those obtained by **Alam et al (2007), Ozberket et al (2009)** and **Kilic (2010)** who reported that bed planting method gave higher grain $spike^{-1}$ than convention one.

Table 2. Effect of planting methods and nitrogen levels on yield components of wheat under some varieties.

Planting methods	Number of spikes m^{-2}		Number of grains $spike^{-1}$		1000-grain weight (g)	
	1st season	2nd season	1st season	2nd season	1st season	2nd season
Flat	355.4[c]	386.7[c]	49.0[c]	46.9[c]	28.5	28.6
Ridges	362.1[b]	394.1[b]	52.1[b]	50.2[b]	28.5	28.7
Raised bed	369.5[a]	401.0[a]	55.7[a]	52.3[a]	28.5	28.8

- Main effect of planting methods (A)

Any two means wit distinet letters differ (P < 0.05, LSD)

- Main effect of varieties (B)

Sids 14	362.0	357.8	49.7[b]	47.8[b]	28.5	28.7
Misr 2	362.7	356.5	54.8[a]	51.8[a]	28.5	28.7

Any two means wit distinet letters differ (P < 0.05, LSD)

0.0	312.5[c]	308.5[c]	36.3[c]	34.2[c]	26.7[c]	27.6[c]
120	375.5[b]	369.1[b]	59.0[b]	55.5[b]	28.7[b]	28.5[b]
180	399.0[a]	393.9[a]	61.6[a]	59.8[a]	30.2[a]	30.1[a]

Any two means wit distinet letters differ (P < 0.05, LSD)

Interaction	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**

“ Means having same letter not significantly differ level of probability”

Concerning nitrogen level, it is evident that yield components were significantly differed as nitrogen levels diverged. Wheat plants supplied with higher nitrogen level (180 kg ha^{-1}) gave the highest yield components of wheat than control and 120 kg N ha^{-1} in both seasons. The positive response of yield components to increasing nitrogen levels may be due the relative reduction in organic matter content in soil, consequently having low available nitrogen. In this connection **Abdallah (1987)**

indicated that nitrogen application increased photosynthetic activity of leaves, in turn produce higher accumulation of metabolites, thus increased yield and yield components. These results are in accordance with those obtained by **Hossain et al (2006)** and **Ismail et al (2015).**

The data of the interaction reveal that yield components were not affected by the interaction between treatments. In general, Misr 2 variety when planting in raised bed method and received 180 kg N ha^{-1} exhibited the highest number of grains $spike^{-1}$.

Yield parameters:

The effect of planting methods and nitrogen level for some wheat varieties are given in **Table 3**. With regard to varieties, the results show that Misr 2 surpassed Sids 14 in grain and biological yield, while straw yield showed the opposite trend. The relative increase of grain and biological yields of Misr 2 variety reached to 6.2 and 1.1 % over Sids 14 variety in the first season, respectively. Same trends were obtained in the second season. The superiority of Misr 2 on wheat yields is mainly due to its effect on growth parameters and yield components as mentioned before **(Table 1 and 2)**. In this concern, **Mekky et al (2007)** mentioned that the differences between the effects of wheat varieties may be attributed to genetic structure and its tolerance variation to the environmental conditions, consequently effect wheat yield. These results are in harmony with those obtained by **Zafar et al (2016)** and **Sarhan and Abd El-Hamed (2018)**.

Table 3. Effect of planting methods and nitrogen levels on yields of wheat under some varieties.

- Main effect of planting methods (A)

Planting methods	Grain yield (Mg ha^{-1})		Straw yield (Mg ha^{-1})		Biological yield	
	1st season	2nd season	1st season	2nd season	1st season	2nd season
Flat	4.84^{c}	4.71^{c}	8.47^{c}	8.31^{c}	13.31^{c}	13.02^{c}
Ridges	5.17^{b}	4.98^{b}	9.18^{b}	9.10^{b}	14.35^{b}	14.08^{b}
Raised bed	5.48^{a}	5.38^{a}	10.27^{a}	10.07^{a}	15.75^{a}	15.45^{a}

- Main effect of varieties (B)

Sids 14	**5.01^{b}**	**4.82^{b}**	**9.38**	**9.19**	**14.39^{b}**	**14.01^{b}**
Misr 2	**5.32^{a}**	**5.23^{a}**	**9.23**	**9.12**	**14.55^{a}**	**14.35^{a}**

- Main effect of nitrogen levels (kg ha^{-1}) (C)

0.0	**2.96^{c}**	**2.80^{c}**	**5.72^{c}**	**5.53^{c}**	**8.67^{c}**	**8.33^{c}**
120	**5.93^{b}**	**5.82^{b}**	**10.64^{b}**	**10.41^{b}**	**16.58^{b}**	**16.23^{b}**
180	6.60^{a}	6.45^{a}	11.58^{a}	11.53^{a}	18.18^{a}	17.99^{a}

Interaction	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**

" Means having same letter not significantly differ level of probability"

As for planting methods, the results show that planting methods were significantly affected grain, straw and biological yields. Raised bed method showed maximum grain yield (5.48 and 5.38 Mg ha^{-1}), straw yield (10.27 and 10.07 Mg ha^{-1}) and biological yields (15.75 and 15.45 Mg ha^{-1}) in both seasons, respectively followed by ridged method, while flat method gave the lowest ones. The superiority of raised bed on wheat yields could be explained by higher growth and yield attributes caused by this planting method as discussed in **Table 1 and 2**. **Sayre et al (1992), Hobbs et al (2000)** and **Hosiam et al (2006)** had similar observation when they studied on different planting methods.

Respecting nitrogen levels, the data reveal that nitrogen application had markedly effect on wheat yields. Increasing nitrogen levels up to 180 kg N ha^{-1} was significantly increased wheat yield parameters. These increment may be due to nitrogen is the most important nutrients for the plant which needed in large amounts, consequently added nitrogen at higher dose showed positively marked effect on growth and yield attributes, hence increased grain and straw yields. Similar results were obtained by **Ali et al (2009), Rahman et al (2014)** and **Ismail et al (2015)**.

The data of the interaction reveal that wheat yields did not respond to the interaction between any two of the studied treatment or among them. The highest wheat yields were attained for Misr 2 variety when planted in raised bed method and treated with 180 kg N ha^{-1}. Whereas, Sids 14 variety under flat method and without nitrogen fertilization possessed the lowest wheat yields.

Nutrient status:

The nutrient status in term of N, P and K concentration and uptake in both grains and straw are given in **Tables 4,5,6,7** and **8**. It is evident from the data that varieties were significantly affected nutrient uptake in grains and/or straw, except in straw while nutrient content did not affect. Misr 2 uptake more N, P and K than Sids 14, which mainly due to Misr 2 varieties produced higher grain and straw yield, since nutrient uptake calculated as multiplying nutrient concentration by grain or straw yield. Many workers were stated the varietal differences in its nutrient uptake such as **Hassanein (2001), El-Abady et al (2009)** and **Sarhan and Abd El-Hamed (2018).**

As for the main effect of planting methods, the data indicate that nutrient concentration in both straw and grains did not respond to planting methods, while N, P and K uptake in grains and/or straw were affected by planting methods. It could be arranged the effect of planting methods on nutrient uptake in the descending order as follow: raised bed > ridges > flat methods. The relative increment in total N, P and K uptake due to raised bed methods reached to 13.3, 12.7 and 13.2 % over flat method in the first season. Similar trends were obtained in the second seasons. It is obvious to notice that the effect of planting methods was in parallel to its effect on grains or straw yield. In this concern, **Sayre and Ramos (1997)** reported that bed

planting method had some advantage on wheat growing over flat method such as better placement

Table 4. Effect of planting methods and nitrogen levels on N, P and K concentration in wheat grains under some varieties.

- Main effect of planting methods (A)

Planting methods	N (g kg^{-1})		P (g kg^{-1})		K (g kg^{-1})	
	1st season	2nd season	1st season	2nd season	1st season	2nd season
Flat	**11.28**	**11.26**	**3.13**	**3.16**	**6.27**	**6.15**
Ridges	**11.28**	**11.27**	**3.12**	**3.16**	**6.29**	**6.15**
Raised bed	**11.29**	**11.43**	**3.13**	**3.16**	**6.28**	**6.15**

- Main effect of varieties (B)

Sids 14	**11.28**	**11.27**	**3.12**	**3.16**	**6.27**	**6.15**
Misr 2	**11.29**	**11.37**	**3.13**	**3.17**	**6.29**	**6.15**

- Main effect of nitrogen levels (kg N ha^{-1}) (C)

0.0	**11.12^{c}**	**11.10^{c}**	**2.98^{c}**	**2.34^{c}**	**5.63^{c}**	**5.52^{c}**
120	**11.31^{b}**	**11.29^{b}**	**3.45^{b}**	**3.49^{b}**	**6.38^{b}**	**6.21^{b}**
180	**11.43^{a}**	**11.41^{a}**	**3.62^{a}**	**3.67^{a}**	**6.84^{a}**	**6.72^{a}**

Interaction	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**

" Means having same letter not significantly differ level of probability"

Table 5. Effect of planting methods and nitrogen levels on N, P and K concentration in wheat straw under some varieties.

- Maine effect of planting methods (A)

Planting methods	N (g kg^{-1})		P (g kg^{-1})		K (g kg^{-1})	
	1st season	2nd season	1st season	2nd season	1st season	2nd season
Flat	**3.32**	**3.61**	**1.19**	**1.23**	**0.64**	**0.61**
Ridges	**3.31**	**3.61**	**1.20**	**1.23**	**0.64**	**0.62**
Raised bed	**3.29**	**3.60**	**1.20**	**1.23**	**0.64**	**0.61**

- Maine effect of varieties (B)

Sids 14	**3.29**	**3.61**	**1.19**	**1.23**	**0.65**	**0.61**
Misr 2	**3.31**	**3.60**	**1.20**	**1.23**	**0.64**	**0.61**

- Maine effect of nitrogen levels (kg N ha^{-1}) (C)

0.0	**2.02^{c}**	**3.00^{c}**	**0.74^{c}**	**0.76^{c}**	**0.42^{c}**	**0.38^{c}**
120	**3.29^{b}**	**3.28^{b}**	**1.23^{b}**	**1.27^{b}**	**0.67^{b}**	**0.65^{b}**
180	**4.61^{a}**	**4.55^{a}**	**1.63^{a}**	**1.23^{a}**	**0.85^{a}**	**0.82^{a}**

Interaction	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**

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Table 6. Effect of nitrogen levels and planting methods on N, P and K uptake in wheat grains under some varieties.

- Main effect of planting methods (A)

Planting methods	N (kg ha^{-1})		P (kg ha^{-1})		K (kg ha^{-1})	
	1st season	2nd season	1st season	2nd season	1st season	2nd season
Flat	**54.76^{c}**	**53.20^{c}**	**16.01^{c}**	**15.86^{c}**	**31.09^{c}**	**29.71^{c}**
Ridges	**58.54^{b}**	**56.31^{b}**	**17.10^{b}**	**16.68^{b}**	**33.32^{b}**	**31.40^{b}**
Raised bed	**62.06^{a}**	**61.81^{a}**	**18.04^{a}**	**17.90^{a}**	**35.18a**	**33.80^{a}**

- Main effect of varieties (B)

Sids 14	**56.66^{b}**	**54.47^{b}**	**16.56^{b}**	**16.15^{b}**	**32.15^{b}**	**30.37^{b}**
Misr 2	**60.26^{a}**	**59.75^{a}**	**17.55^{a}**	**17.48^{a}**	**34.24^{a}**	**32.90^{a}**

- Main effect of nitrogen levels (kg N ha^{-1}) (C)

0.0	**32.87^{c}**	**31.09^{c}**	**6.84^{c}**	**6.55^{c}**	**16.63^{c}**	**15.46^{c}**
120	**67.06^{b}**	**66.64^{b}**	**20.45^{b}**	**20.26^{b}**	**37.81^{b}**	**36.10b**
180	**75.44^{a}**	**73.59^{a}**	**23.87^{a}**	**23.63^{a}**	**45.15^{a}**	**43.35^{a}**

Interaction	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**

" Means having same letter not significantly differ level of probability"

Table 7. Effect of planting methods and nitrogen levels on N, P and K uptake in wheat straw under some varieties.

- Main effect of planting methods (A)

Planting methods	N (kg ha^{-1})		P (kg ha^{-1})		K (kg ha^{-1})	
	1st season	2nd season	1st season	2nd season	1st season	2nd season
Flat	31.25^{c}	31.66^{c}	11.22^{c}	11.33^{c}	5.97^{c}	5.61^{c}
Ridges	32.63^{b}	34.08^{b}	11.77^{b}	12.04^{b}	6.29^{b}	6.04^{b}
Raised bed	35.96^{a}	37.33^{a}	13.04^{a}	13.18^{a}	6.98^{a}	6.53a

- Main effect of varieties (B)

Sids 14	33.51	34.52	12.12	12.23	6.52	6.06
Misr 2	33.04	34.19	11.90	12.14	6.31	6.06

- Main effect of nitrogen levels (kg N ha^{-1}) (C)

0.0	11.50^{c}	16.56^{c}	4.19^{c}	4.20^{c}	2.40^{c}	2.11^{c}
120	35.01^{b}	34.12^{b}	13.05^{b}	13.19^{b}	7.09^{b}	6.68^{b}
180	53.33a	52.38^{a}	18.78^{a}	19.16^{a}	9.76^{a}	9.39^{a}

Interaction	N.S	N.S	N.S	N.S	N.S	N.S

`" Means having same letter not significantly differ level of probability"

Table 8. Effect of planting methods and nitrogen levels on total N, P and K uptake under some varieties.

- Maine effect of planting methods (A)

Planting methods	N (kg ha^{-1})		P (kg ha^{-1})		K (kg ha^{-1})	
	1st season	2nd season	1st season	2nd season	1st season	2nd season
Flat	**86.01^{c}**	**84.85^{c}**	**27.23^{c}**	**27.19^{c}**	**37.06^{c}**	**21.52^{c}**
Ridges	**91.17^{b}**	**90.39^{b}**	**28.87^{b}**	**28.72^{b}**	**39.62^{b}**	**23.05^{b}**
Raised bed	**98.02^{a}**	**99.13^{a}**	**31.09^{a}**	**31.08^{a}**	**42.15^{a}**	**25.18^{a}**

- Maine effect of varieties (B)

Sids 14	**90.17^{b}**	**88.99^{b}**	**28.68^{b}**	**28.37^{b}**	**38.67^{b}**	**22.60^{b}**
Misr 2	**93.30^{a}**	**93.93^{a}**	**29.44^{a}**	**29.62^{a}**	**40.56^{a}**	**23.91^{a}**

- Maine effect of nitrogen levels (kg N ha^{-1}) (C)

0.0	**44.37^{c}**	**47.65^{c}**	**11.03^{c}**	**10.75^{c}**	**16.63^{c}**	**15.46^{c}**
120	**102.07^{b}**	**100.75^{b}**	**33.49^{b}**	**33.45^{b}**	**37.81^{b}**	**36.10^{b}**
180	**128.77^{a}**	**125.98^{a}**	**42.66^{a}**	**42.79^{a}**	**45.15^{a}**	**43.35^{a}**

Interaction	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**	**N.S**

" Means having same letter not significantly differ level of probability"

of fertilizers, in turn enhanced nutrient uptake. These results are in harmony with those obtained by **Abdel Rehman et al (2011)**.

Regarding the effect of nitrogen levels, the data cleary show that both nutrient concentration and uptake were significantly affected by nitrogen levels. Increasing nitrogen level up to 180 kg ha^{-1} were increased nutrient concentration and uptake in grains and straw. The increment in nutrient status in wheat due to increasing nitrogen levels may be attributed to added high level of nitrogen leads to more rapid leaf area development, enhances leaf area duration after flowering stage and improves over all crop assimilation, consequently enhanced nutrients uptake (**Balasubramaniyan and Palaniappan, 2001**). These results are in accordance with those obtained by **Ismail et al (2014)** and **Ismail et al (2015).**

The results of the interaction indicate that nutrients concentration or uptake did not affect by the interaction between treatments. The treatment of Misr 2 variety + raised bed method + 180 kg N ha^{-1} gave the highest values of N, P and K uptake in grains and/or straw, while the lowest ones were referred to treatment of Sids 14 varity + flat method + without nitrogen application.

CONCLUSSION

Raised bed planting method for wheat, a new method in Egypt produced higher wheat productivity of some wheat varieties. The results of this study demonstrated the cultivation of wheat with raised bed and added 180 kg N ha^{-1} with the superiority of Misr 2 variety than Sids 14. Therefore, it could be concluded to cultivate Misr 2

by using raised bed method with added 180 kg N ha^{-1} to maximizing wheat production.

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تأثير طرق الزراعة ومعدلات التسميد النيتروجيني علي الأنتاجية لبعض اصناف القمح

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أجريت تجربتان حقليتان في موسمي النمو٢٠١٨/٢٠١٧ ، ٢٠١٩/٢٠١٨ لدراسة تأثير طرق الزراعة (أحواض ، خطوط ، مصاطب) والتسميد النيتروجيني (٠ ، ١٢٠ ، ١٨٠ كجم /هكتار) لصنفي القمح (سدس ١٤ ، مصر٢) علي صفات النمو والمحصول ومكوناته وتركيز وامتصاص عناصر النيتروجين والفوسفور والبوتاسيوم في الحبوب والقش، وأستخدم تصميم قطع منشقه المنشقه في قطاعات كاملة العشوائية في اربع مكررات. وكانت أهم النتائج المتحصل عليها هي كما يلي :-

- تفوق صنف مصر ٢علي صنف سدس ١٤ في جميع صفات النمو والمحصول ومكوناته وامتصاص عناصر النيتروجين والفوسفور والبوتاسيوم ماعدا وزن ألاف حبة.
- أدت طريقة الزراعة علي مصاطب لأعلي قيم في صفات النمو والمحصول ومكوناته وامتصاص عناصر النيتروجين والفوسفور والبوتاسيوم ماعدا وزن ألاف حبة.
- أدي زيادة معدلات التسميد النيتروجيني الي ١٨٠ كجم/هكتار الي أعلي قيم لصفات النمو والمحصول ومكوناته وتركيز وامتصاص عناصر النيتروجين والفوسفور والبوتاسيوم.
- تشير نتائج التداخل الي أن معاملة صنف مصر ٢ عند زراعته علي مصاطب وتسميده بمعدل ١٨٠ كجم نيتروجين/هكتار قد سجل أعلي قيم لصفات النمو والمحصول ومكوناته وامتصاص العناصر.

من نتائج الدراسة يمكن التوصية بزراعة صنف مصر٢ علي مصاطب وتسميده بمعدل ١٨٠ كجم نيتروجين/هكتار للحصول علي أعلي أنتاجية للقمح.