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INFLUENCE OF SOME TECHNOLOGICAL FERTILIZATION AND NITROGEN FERTILIZER LEVELS ON WHEAT GROWTH AND YIELD COMPONENTS

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ABSTRACT

The field experiment was conducted in a Private Farm at Qutaiyifet El-Aziziya Village, Minya El-Qamh District, Sharkia Governorate, Egypt, in a split-plot design with three replications during the two successive winter seasons of 2021/2022 and 2022/2023. This investigation aimed to find out the effect of nitrogen fertilizer levels under some new technological fertilizer (Compound fertilizer in liquid form, bio – fertilizers and Nano-fertilizer) on wheat (Misr-1 cv.) growth, yield and its components. The main plots allotted to liquid compound fertilizer (1L /fed), commercial bio-fertilizers (at the rate of 1 kg /fed from Cerialine, Phosphourine and Potassiummag) and N, P, K Nano-fertilizer (400-ppm /fed). While sub plots assigned to five mineral N-fertilizer rates (0.0, 40, 60, 80 and 100 kg /fed) as ammonium nitrate.

The important results could be summarized as follows:

1- *Liquid compound fertilizer (as new technological fertilizer) led to higher values of plant height (cm), number of green leaves, flag leaf area (cm^2), No. of grains/spike, No. of spikelets / spike, 1000- grain weight, biological yield (ton /fed), as well as harvest index (%).*
2- *Nitrogen fertilization with rate of 100 kg /fed has been resulted in better biological yield (ton /fed), harvest index (%) and 1000- grain weight beside higher values of plant height, number of green leaves, No. of grains/spike, No. of spikelets / spike, flag leaf area (cm^2).*
3- *The interaction treatment of (100 kg N /fed + liquid compound fertilizer 1L /fed) in the two-studied successive growth growing seasons was the best one, which recorded the maximum values for the previous studied parameters.*

Conclusively: *it could be concluded that the use of 100 kg N /fed., with technological fertilizers (compound fertilizer in the liquid form) under clayey soil conditions gave the highest value of wheat production (Misr-1 cv.) at Sharkia Governorate conditions, Egypt.*

Key words: Wheat, technology fertilizers, nitrogen fertilization levels, growth and yield components.

INTRODUCTION:

Wheat (*Triticum aestivum* L.) is one of the most significant staple food crops for almost 35% of people worldwide. In Egypt, wheat is regarded as one of the most significant food grain crops. Egypt's wheat area is predicted to be 3.4 million feddan, with an output of 8.9 million tons, while 10 million tons are imported **(FAO, STAT, 2020/21).**

To increasing wheat productivity, we must be using the modern of technology in fertilization. New technological fertilizers such as Nano fertilizers, bio fertilizers and liquid compound fertilizers are modern technologies for increasing crop production **(Scott and Chen 2012; Batsmanova *et al*., 2013).**

Bio-fertilizers enhancing the soil fertility and nutrient status through the natural processes of nitrogen fixation, solubilizing phosphorus and availability of potassium.

Bio fertilizers play an important role in increasing crop productivity. Using bio fertilizers led to decrease the usage of chemical pesticides and fertilizers thus bio-fertilizers are a less polluted. Inoculants are recommended mainly for wheat **(Dahm *et al*., 1993)**.

Wheat plants showed a highly significant response to applying NPK Nano fertilizer as foliar nutrition. Plant length, number of spikes, straw and grain yield of wheat increased significantly with foliar application of NPK-Nano fertilizer **(Abdou *et al*., 2018, Al-Juthery, 2018; Munir *et al*., 2018; and Dal Cortivo *et al*., 2020). Hussain *et al.* (2021)** showed that using Nano fertilizer at a level of 2 g/L and nitrogen fertilizer rate of (40 Kg ha^{-1}) gave a significant response to wheat yield.

Nitrogen is an essential element for common wheat growth and enhances grain yield. Numerous studies suggested that adding nitrogen to wheat raised the crop's overall grain yield **(Janmohammadi *et al.* 2016, Moursy *et al.* 2020 and Hamoda 2024)**. **Al-Jabri (2020)** demonstrated that nitrogen fertilization treatment at rate of 200 kg ha^{-1} was preferable to

produce the greatest values for grain and biological yields. **Allam (2005)** stated that nitrogen fertilizer at rate of 90 kg N /fed produced the highest values of wheat grain and straw yields as well as biological yield compared to the other nitrogen levels (30, 60, and 120 kg N /fed). **Rusek *et al.* (2016)** reported that the average wheat yield increased by almost 30% following the application of urea-su/phosphate and concentrated su/phosphate with urea fertilizers.

Therefore aim of this work is to determine the impact of different levels of nitrogen fertilizer and modern technology fertilizers on vegetative characters and yield of the wheat variety Misr- 1.

MATERIALS AND METHODS

Using a split plot arrangements replicated three times within a randomized complete block design, two field experiments were carried out at a private farm in Qutaiyifet El-Aziziya Village, Minya Elqamh District, Sharkia Governorate, Egypt during the two winter seasons of 2021/2022 and 2022/2023.

The three new technological fertilizers besides the control treatment were occupied main plots as follows:

1- Control treatment (without adding any technological fertilizers).
2- Technological fertilization :

a. The liquid compound fertilizer consisting of N 20, P_2O_5 20, K_2 O 20, Fe 0.3, Cu 0.5, Mg 5, Zn 0.3, Mn 0.3, S 1, B 0.01and Mo 0.01% at the rate of 1 L /fed.
b. Three commercial bio-fertilizers, i.e. Cerialine (free-living bacteria fixing nitrogen), Phosphoren (phosphorus dissolving bacteria) and Botassiummag (potassium solubilizing bacteria) at the rate of 1 kg /fed from each.
c. Nano - fertilizer in the liquid form contains N, P, and K in concentrations of 10, 10 and 10 %, respectively, at a rate of 400-ppm /fed.

Mineral nitrogen fertilizer levels (0.0, 40, 60, 80, and 100 kg N /fed) as ammonium nitrate (330 g N kg^{-1}) were placed in the sub plots. Broadcast-grown wheat seeds (*Triticum aestivum* L.) var. Misr-1 was sown in experimental plots, each with an area of 2 x 3 m. During the soil preparation, the recommended rates of potassium (20 kg K /fed) as potassium sulphate (400 g K kg^{-1}) and phosphorus (7 kg P /fed) as calcium – su/phosphate (68 g P kg $^{-1}$) were added. On November 12th of each growing season, wheat seeds are wetted with an arabic gum solution

combined with bio fertilizers, and then sown in rows 20 cm apart.

The liquid compound and Nano-fertilizer carried out manually in two equal dosages and applied after 45 and 75 days after sowing. Three equal splitting dosages of nitrogen fertilizer applied after 25, 55, and 85 days from seeding. The standard agricultural o/ations for wheat crop were carried out successfully. Randomly selected soil samples were air-dried before being crushed and then passed through a 2-mm sieve. The main physical and chemical characteristics of the soil under study were determined using the conventional techniques outlined in **Sparks (1996)** and **Estefan *et al.*, (2013)** as shown in Table (1).

Table (1): Some physical and chemical pro/ties of the experimental sites at 30 cm soil depth (in the two seasons)

Soil characteristic	First season (2021/2022)	Second season (2022/2023)
Mechanical analysis		
Sand %	11.02	10.96
Silt %	28.89	25.33
Clay %	60.09	63.71
Soil texture	Clay	Clay
Chemical analysis		
pH (1: 2.5susp.)	7.57	8.03
EC_e (Soil paste at 25°C)	0.92 ds / m	0.97 ds / m
Soil-CEC ($cmol_c\ kg^{-1}$) (Amm. acetate ext.)	45.20	44.80
O.M % (Wakely & Black method)	1.35	1.47
Available N (mg/kg) **(K_2SO_4 ext.)**	30.01	29.75
Available P (mg/kg) (Olsen ext.)	9.59	9.13
Available K (mg/kg) **(Amm. acetate ext.)**	321	297
Available Zn (mg/kg)	0.27	0.23

Notes:1- Soil analyses were done using representative composite samples.
Extraction solution for available N (KCl), P (Na-bicarbonate), K (NH_4-acetate).

Data recorded:

A. Growth characters:

Samples of five plants were randomly selected from the inner four rows of each sub plot, and the following attributes were measured (when heading spikes was complete).

1. Plant height (cm): This was measured as the distance between the top of the main spike and the ground.

2. The number of green leaves/plant.
3. Flag leaf area (cm^2): five randomly selected plants / plot were measured using the technique stated by **Lal and Subba Roa (1951)**. Cm^2 = length × maximum width × 0.72 is the flag leaf area.

B- Yield and yield attributes (161 days from seeding to harvest):

A sample of five randomly selected plants from each plot was collected, and the following attributes were determined as follows:

1. Number of grains / spike: It was counted as an average mean of five main spikes/ plot.
2. Number of spikelets /spike: The average mean of the five main spikes/plot were used to count.
3. 1000-grain weight (g.): it was calculated as the average of randomly selected sample of 1000 grains from the plot.

The biological yield (ton /fed), in addition, the yields from five center rows of one meter in length were used to construct the harvest index (1 m^2).

4. Biological yield (ton /fed): The total yield, or biological yield (kg /fed), was calculated by weighting the average above-ground wheat plants (grains and straw) from 1 square meter for each plot.
5. Harvest index (%): The following formula was used to determine the harvest index.

$$\text{Harvest index (\%)} = \left(\frac{\text{seed yield}}{\text{seed yield+straw yield}}\right) \times 100$$

The data were statistically analyzed with the Analysis of Variance (ANOVA) method. Variations throughout treatments have been investigated using **Duncan (1955) method**. Using the **COSTAT system for windows, version 6:311 (cohort software, Berkeley, CA, USA)**.

RESULTS AND DISCUSSION:

a- Effect of Technological Fertilizers:

Data in Tables (2, 3 and 4) show that plant height (cm), number of green leaves, flag leaf area (cm^2), No. of grains/spike, No. of spikelets/ spike, 1000- grain weight, biological yield (ton /fed), as well as harvest index (%) significantly affected by applying new technological fertilizers.

Plant height (cm) significantly increased by the application of the liquid compound fertilizer. These findings hold true for both growing seasons. The results showed that nano and bio fertilizers equaled to 13.51 %, 5.99 % and 1.34 % in the combined, respectively, compared to control treatment. Number

of green leaves/plant and flag leaf area increased in a manner resembling the

Table (2): Plant height (cm), No. of green leaves/plant and flag leaf area (cm^2) as affected by some technological fertilizers and nitrogen fertilizer levels in 2021/2022 and 2022/2023 winter seasons and their combined

Characters / Treatments	Plant height (cm)			Number of green leaves/plant			Flag leaf area (cm^2)		
	First season 2021/2022	Second season 2022/2023	Combined	First season 2021/2022	Second season 2022/2023	Combined	First season 2021/2022	Second season 2022/2023	Combined
A-Technological Fertilizers									
Control	93.84 d*	93.09 d	93.47 d	28.58 d	27.94 d	28.26 d	36.18 d	35.43 d	35.81 d
Bio.	100.9 c	99.26 c	100.1 c	31.77 c	31.02 c	31.40 c	39.20 c	38.30 c	38.75 c
liquid	107.2 a	104.9 a	106.1 a	34.91 a	34.31 a	34.61 a	42.73 a	41.89 a	42.31 a
Nano	106.0 b	103.4 b	104.7 b	34.73 b	33.92 b	34.33 b	42.21 b	41.42 b	41.82 b
LSD (0.05)	0.04	0.0193	0.0297	0.1482	0.1534	0.1508	0.0199	0.0164	0.0182
F .test	**	**	**	**	**	**	**	**	**
B- Nitrogen Fertilizer Levels (kg /fed)									
0	93.90 e	93.06 e	93.48 e	27.84 e	26.84 e	27.34 e	37.50 e	36.49 e	36.99 e
40	97.42 d	96.11 d	96.77 d	30.42 d	29.95 d	30.19 d	38.45 d	37.51 d	37.98 d
60	102.9 c	99.85 c	101.4 c	32.41 c	31.69 c	32.05 c	40.06 c	39.29 c	39.68 c
80	106.9 b	104.5 b	105.7 b	35.55 b	34.86 b	35.21 b	41.26 b	40.53 b	40.90 b
100	108.8 a	107.3 a	108.1 a	36.27 a	35.64 a	35.96 a	43.14 a	42.48 a	42.81 a
LSD (0.05)	0.0447	0.0216	0.0332	0.1657	0.1715	0.1686	0.0223	0.0184	0.0204
F .test	**	**	**	**	**	**	**	**	**
C- Interaction									
A*B (F .test)	**	**	**	**	**	**	**	**	**
LSD (0.05)	0.0895	0.0432	0.0664	0.3319	0.3435	0.3377	0.0446	0.0368	0.0407

* Means followed by Unlike Alphabet(s) within a treatment Column and /and are Significantly Different DMRT (p=0.05).

Bio = (Cerialate, Phosphorwise and Potassiumone), Liquid = [Compound fertilizer in the liquid form (N 20%, P_2O_5 20%, K_2 o 20%, Fe 0.3%, Cu 0.5%, , Mg 5%, Zn 0.3%, Mo 0.3%, S 1%, B 0.01% and Mo 0.01%)], Nano = (N, P and K by (cent age 10: 10: 10).

Table (3): No. of grains/spike, No. of spikelets/spike and 1000-grain weight (g) as affected by some technological fertilizers and nitrogen fertilizer levels in 2021/2022 and 2022/2023 winter seasons and their combined

Characters / Treatments	Number of grains /spike			Number of spikelets/spike			1000-grain weight (g)		
	First season 2021/2022	Second season 2022/2023	Combined	First season 2021/2022	Second season 2022/2023	Combined	First season 2021/2022	Second season 2022/2023	Combined
	A-Technological Fertilizers								
Control	65.74 d*	64.46 d	65.10 d	19.22 c	18.64 c	18.93 d	51.55 c	50.12 d	50.84 d
Bio.	72.31 c	71.07 c	71.69 c	19.75 b	19.50 b	19.63 c	54.49 b	52.57 c	53.53 c
liquid	78.48 a	77.11 a	77.80 a	20.88 a	20.61 a	20.75 a	56.06 a	54.04 a	55.05 a
Nano	77.17 b	76.01 b	76.59 b	20.59 a	20.29 a	20.44 b	54.91 b	53.45 b	54.18 b
LSD (0.05)	0.7383	0.4113	0.5748	0.3793	0.3442	0.3618	0.9669	0.4583	0.7126
F .test	**	**	**	**	**	**	**	**	**
	B- Nitrogen Fertilizer Levels (kg /fed)								
0	64.56 e	63.83 e	64.20 e	18.67 e	18.42 e	18.55 e	50.65 e	48.32 e	49.49 e
40	69.44 d	68.25 d	68.85 d	19.35 d	18.94 d	19.15 d	52.41 d	50.35 d	51.38 d
60	73.94 c	72.24 c	73.09 c	20.23 c	19.89 c	20.06 c	54.22 c	52.35 c	53.29 c
80	78.09 b	76.72 b	77.41 b	20.81 b	20.55 b	20.68 b	55.73 b	54.98 b	55.36 b
100	81.11 a	79.77 a	80.44 a	21.49 a	21.01 a	21.25 a	58.25 a	56.74 a	57.50 a
LSD (0.05)	0.8254	0.4598	0.6426	0.4241	0.3849	0.4045	1.0811	0.5124	0.7968
F .test	**	**	**	**	**	**	**	**	**
			C- Interaction						
A*B (F .test)	**	**	**	**	**	**	**	**	**
LSD (0.05)	1.6534	0.9211	1.2873	0.8495	0.7709	0.8102	2.1654	1.0264	1.5959

* Means followed by Unlike Alphabet(s) within a treatment Column and /and are Significantly Different DMRT (P=0.05).

Bio = (Cerialine, Phosphouvine and Potassiumag).

Liquid = [Compound fertilizer in the liquid form (N 20%, P_2O_2 20%, K_2 o 20%, Fe 0.3%, Cu 0.5%, Mg 5%, Zn 0.3%, Mo 0.3%, S 1%, B 0.01% and Mo 0.01%)]., **Nano** = (N, P and K by /centage 10: 10: 10).

plant height. Additionally, results indicated that application of the liquid compound fertilizer produced highest values of grains number / spike, number of spikelets /spike, 1000- grain weight, biological yield (ton /fed), as well as harvest index in grains followed by nano and bio fertilizers treatments. Generally, the increases were (19.51, 8.52 & 1.58%), (9.61, 5.71 & 1.52%), (8.28, 2.84 & 1.61%), (16.07, 8.78 & 6.79) and (13.31, 5.61& 3.84%) for number of grains / spike, number of spikelets /spike, 1000- grain weight (g), biological yield (ton /fed) and harvest index (%) in grains compared to control treatment, combined effects of both seasons' applications of the liquid compound, nano, and bio fertilizers, respectively. These significant increases were most likely due to the liquid compound fertilizer's concentration of micronutrients, which enhanced plant growth and production by increasing enzyme activity, improving cell physiology, and enhancing the photosynthetic process (**Stewart *et al.*, (2021))**. These results are agreed with **Kandil and Marie (2017), Abdou *et al*., (2018), Al-Juthery *et al.*, (2018), Dal Cortivo *et al*., (2020), Moursy *et al*., (2020), Hussain *et al.*, (2021) and Hamoda (2024),** they concluded that nano and bio fertilizers significantly increased vegetative growth and yield of wheat.

b - ***Effect of mineral nitrogen fertilizer levels:***

The results in Table (2) showed that No. of green leaves /plant, flag leaf area (cm^2) and 1000-grain weight (g) significantly affected by N-fertilizer levels. The increments of (31.53, 19.11, 12.20 & 2.13 %), (15.73, 12.72, 7.89 & 4.67 %) and (16.19, 11.91,7.90 & 3.87 %) for number of green leaves/plant, flag leaf area (cm^2) and 1000-grain yield as a result of applying 40, 60, 80, and 100 kg N /fed respectively, in comparison to N fertilizer rate without nothing further is added. These results could be the important role of nitrogen, it is an essential nutrient for plants, which enhanced photosynthetic activity and the amount of metabolites required to proceed with more effective grain production, as well as the vegetative growth of the wheat plant (**Dagash *et al*., (2014), Seadh *et al*., (2017) and Imdad Ullah *et al*., (2018)).** The results above match with those obtained by **Rahman *et al*., (2014), Buráňová *et al*., (2015), Kandil *et al*., (2016), Litke *et al*., (2017), Litke *et al*., (2018), Ewis (2019) and Rafiq *et al*., (2023).**

Regarding the grain yield, data presented in Tables (3 and 4) show that increasing N fertilizer levels gradually from 40, 60, 80, to 100 kg caused significantly increases in No. of grains/spike, No. of spikelets/spike, and B.Y (ton /fed)in wheat grains. Applying 100 kg N /fed as the average of two

Table (4): Biological yield (ton /fed) and Harvest index (%) as affected by some technological fertilizers and nitrogen fertilizer levels in 2021/2022 and 2022/2023 winter seasons and their combined

Characters / Treatments	Biological yield (ton /fed)			Harvest index (%)		
	First season 2021/2022	Second season 2022/2023	Combined	First season 2021/2022	Second season 2022/2023	Combined
A-Technological Fertilizers						
Control	6.767 d*	6.449 d	6.608 d	33.02 d	33.38 d	33.20 d
Bio.	7.155 c	6.946 c	7.051 c	35.48 c	35.76 c	35.62 c
liquid	7.952 a	7.387 a	7.670 a	37.06 a	38.18 a	37.62 a
Nano	7.309 b	7.054 b	7.182 b	36.14 b	36.31 b	36.23 b
LSD (0.05)	0.0134	0.0064	0.0099	0.0663	0.0368	0.0516
F .test	**	**	**	**	**	**
B- Nitrogen Fertilizer Levels (kg /fed)						
0	5.872 e	5.634 e	5.753 e	33.01 e	33.41 e	33.21
40	6.857 d	6.319 d	6.588 d	34.18 d	35.42 d	34.76 d
60	7.468 c	7.099 c	7.284 c	35.93 c	36.40 c	36.17 c
80	8.036 b	7.726 b	7.881 b	37.11 a	37.13 b	37.12 a
100	8.248 a	8.019 a	8.134 a	36.98 b	37.18 a	37.08 b
LSD (0.05)	0.015	0.0071	0.0111	0.0742	0.0412	0.0577
F .test	**	**	**	**	**	**
C- Interaction						
A*B (F .test)	**	**	**	**	**	**
LSD (0.05)	0.0301	0.0143	0.0222	0.1486	0.0824	0.1155

* Means followed by Unlike Alphabet(s) within a treatment Column and /or are Significantly Different DMRT (P=0.05).
Bio = (Cerialine, Phosphorucine and Potassiummag)., **Liquid** = [Compound fertilizer in the liquid form (N 20%, P_2O_5 20%, K_2O 20%, Fe 0.3%, Cu 0.5%, Mg 5%, Zn 0.3%, Mn 0.3%, S 1%, B 0.01% and Mo 0.01%)].
Nano = (N, P and K by /cent age 10: 10: 10).

Table (4-a): The interaction effect between Nitrogen levels and technological fertilizers on biological yield (ton /fed) in the combined of both growing seasons

Technological fertilizers	Nitrogen levels (kg /fed)				
	0	40	60	80	100
Control	D 4.882 c*	C 5.872 c	B 6.832 b	A 7.563 c	A 7.893 c
Bio.	D 5.774 b	C 6.563 b	B 7.214 ab	A 7.733 b	A 7.971 b
liquid	D 6.303 a	C 7.272 a	B 7.855 a	A 8.335 a	A 8.583 a
Nano	E 6.053 ab	D 6.645 b	C 7.232 ab	B 7.892 b	A 8.088 ab

* Means followed by Unlike Alphabet(s) within a treatment Column and (or) are Significantly Different DMRT (P=0.05).

Table (4-b): The interaction effect between Nitrogen levels and technological fertilizers on harvest index (%) in the combined of both growing seasons

Technological fertilizers	Nitrogen levels (kg /fed)				
	0	40	60	80	100
Control	D 26.47 c*	C 32.43 c	B 34.10 c	A 36.49 b	A 36.52 ab
Bio.	B 34.39 b	B 34.58 b	A 36.18 b	A 36.41 b	A 36.54 ab
liquid	C 36.30 a	B 37.29 a	A 38.14 a	A 38.41 a	B 37.99 a
Nano	D 35.69 ab	C 34.73 b	B 36.25 b	A 37.19 ab	A 37.26 a

* Means followed by Unlike Alphabet(s) within a treatment Column and (or) are Significantly Different DMRT (P=0.05),

Bio = (Cerialac, Phosphorine and Potassiumag), **Liquid** = [Compound fertilizer in the liquid form (N 20%, P_2O_5 20%, K_2O 20%, Fe 0.3%, Cu 0.5%, Mg 5%, Zn 0.3%, Mo 0.3%, S 1%, B 0.01% and Mo 0.01%)], **Nano** = (N, P and K by /cent age 10: 10: 10).

growing seasons resulted in the maximum No. of grains/spike, No. of spikelets/spike, and biological yield (ton /fed) (9.26, 21.25 and 8.13 ton /fed) with increments of (25.30, 14.56 and 41.39 %) in the combined, respectively. This result can be the consequence of increased soil nitrogen availability to the plant carried on by higher N fertilizer levels (**Rafiq *et al*., (2023)).**

c. ***The interaction effect:***

Results in Tables (2 a & b), (4 a & b), Figures (2 c, 3 a, b & c) indicated that the interaction effect had a positive impact on wheat growth, as well as yield and its components. This is in reference to the interaction effect of the factors under study. The combination of 100 kg N /fed and 1L /fed of liquid compound fertilizer was the best interaction treatment that produced the highest values of (112.9, 38.53, 46.03, 84.43, 22.16, 58.75 & 8.583) for plant height, No. of green leaves/plant , flag leaf area, No. of grains/spike, No. of spikelets /spike, 1000- grain weight and biological yield in grains in the combined of two seasons, respectively in both growing seasons as showed in (Tables (2 a & b), (4 a & b), Figures (2 c, 3 a, b & c).

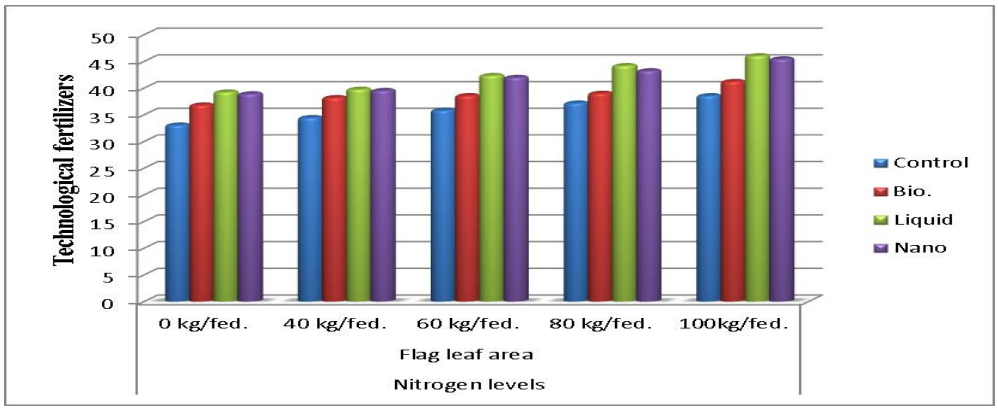

Fig. (2-c): Interaction between nitrogen fertilizer levels and technological fertilizers on Flag leaf area (cm^2)

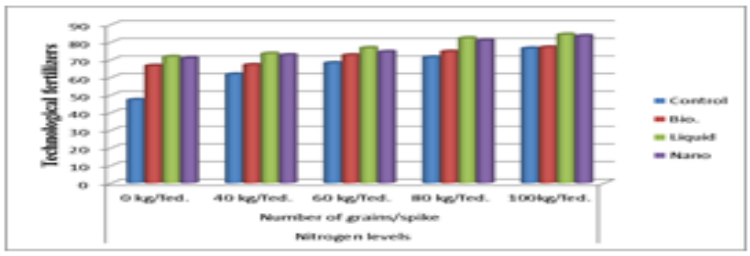

Fig. (3-a): Interaction between nitrogen fertilizer levels and technological fertilizers on Number of grains /spike

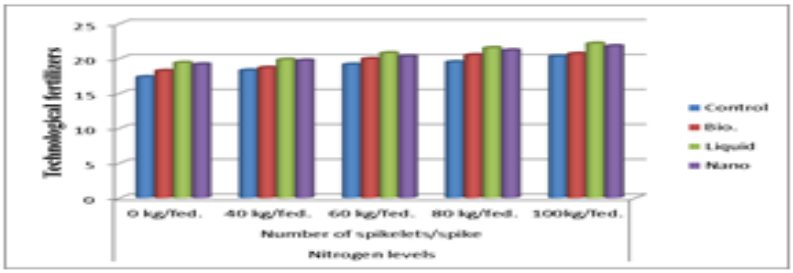

Fig. (3-b): Interaction between nitrogen fertilizer levels and technological fertilizers on Number of spikelets/spike

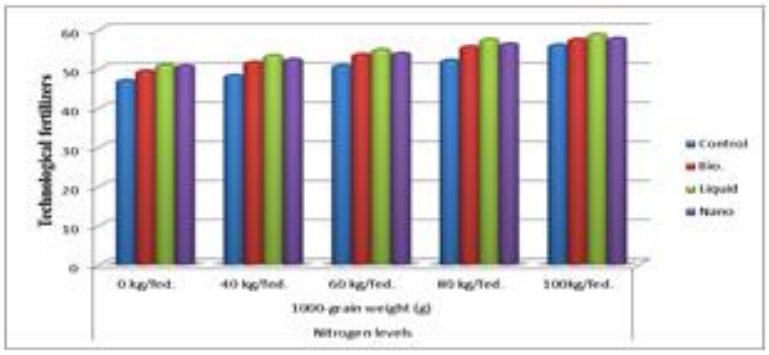

Fig. (3-c): Interaction between nitrogen fertilizer levels and technological fertilizers on 1000-grain weight (g)

These results are consistent with **Morsy *et al.* (2018**). All interaction treatments involving the liquid compound fertilizer gave greater values for harvest index when compared with Nano and/or Bio - fertilizers. The maximum harvest index (%) value of 38.41 was recorded in the treatment of (80 kg N /fed + the liquid compound fertilizer at the rate of 1L /fed). This may be due to grain yield increases at a slower rate than N fertilization levels.

Conclusion:

It is recommended that the use of 100 kg N /fed., with technological fertilizers (compound fertilizer in the liquid form) under clayey soil conditions gave the highest value of wheat production (Misr-1 cv.) at Sharkia Governorate conditions, Egypt.

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تأثير بعض الأسمدة التكنولوجية ومستويات التسميد النيتروجيني على النمو والمحصول ومكوناته في القمح

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أجريت التجربة الحقلية في مزرعة خاصة بقرية قطيفة العزيزية، مركز منيا القمح، محافظة الشرقية، مصر، في تصميم القطع المنشقة بثلاثة مكررات خلال موسمين متتاليان شتاءا ٢٠٢١/٢٠٢٢ و ٢٠٢٢/٢٠٢٣ ؛ يهدف هذا البحث إلى دراسة تأثير مستويات الأسمدة النيتروجينية مع بعض الأسمدة التكنولوجية الحديثة (الأسمدة المركبة السائلة والأسمدة الحيوية والأسمدة النانوية) على نمو وإنتاجية محصول القمح (مصر-١) ومكوناته . القطع الرئيسية تم تخصيصها للأسمدة المركبة السائلة (١ لتر /فدان)، والأسمدة الحيوية التجارية (بمعدل ١ كجم /فدان) من السيريالين والفوسفورين والبوتاسيوماج) والأسمدة النانوية N ، P، K(٤٠٠ جزء في المليون /فدان). بينما خصصت القطع الفرعية لخمسة معدلات من السماد النيتروجيني المعدني (صفر، ٤٠،

٦٠، ٨٠، ١٠٠ كجم /فدان) على شكل نترات الأمونيوم. ويمكن تلخيص أهم النتائج اعلى النحو التالي

١- أدي إضافة السماد المركب السائل (كسماد تكنولوجي حديث) إلى زيادة قيم أطوال النبات (سم)، عدد الأوراق الخضراء، مساحة ورقة العلم (سم٢)، عدد الحبوب/السنبلة، عدد السنيبلات لكل سنبلة، وزن ١٠٠٠حبة ، والمحصول البيولوجي (طن/ فدان)، وكذلك دليل الحصاد.(%)

٢- أدى التسميد النتروجيني بمعدل ١٠٠ كجم /فدان إلى تحسين المحصول البيولوجي (طن/ فدان) ودليل الحصاد (%) ووزن ١٠٠٠ حبة بالإضافة إلى ارتفاع قيم أطوال النبات وعدد الأوراق الخضراء وعدد الأوراق. عدد الحبوب/السنبلة، عدد السنيبلات في السنبلة، مساحة ورقة العلم (سم٢).

٣- معاملة التفاعل (١٠٠ كجم نيتروجين فدان$^{-1}$ + سماد مركب سائل ١ لتر/ فدان) خلال موسمي النمو المتعاقبين هي أفضل المعاملات حيث سجلت أعلى القيم لجميع الصفات المدروسة.

التوصية :

يتم التوصية بمعاملة محصول القمح بالأسمدة التكنولوجية المركبة في الصورة السائلة مع إضافة السماد النيتروجيني بمعدل ١٠٠ كجم ن / فدان ؛تحت ظروف الأراضي الطينية في نطاق محافظة الشرقية والأراضي المشابهة لها في المحافظات الأخرى مصر.