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SOME WHEAT VARIETIES RESPONSE TO NITROGEN FERTILIZATION LEVELS AND ITS EFFECT ON N-UPTAKE

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ABSTRACT

A field experiment was conducted at Sakha Agricultural Research Station farm, Kafr El-Sheikh Governorate, Egypt during 2008/2009 winter season, to assess response of some wheat (*Triticum aestivum* L.) varieties to the nitrogen fertilization levels by determining the dry plant weight, daily increase, N% in the dry matter, nitrogen uptake during the growing periods and nitrogen uptake during the physiological stages. Split plot design with four replicates was used, the main plots were assigned by four wheat varieties of Gimiza 9, Sakha 61, Sakha 93 and Giza 168. The subplots were assigned by four nitrogen levels of 0, 30, 60 and 90 kg N fed.^{1} (ha = 2.4 fed.). Eight plant samples were collected during the growth periods to determine the previous traits.

The obtained results can be summarized as follow:

- Gimiza 9 and Giza 168 had the higher dry plant weight of 6.64 and 6.95 (g/plant) compared to Sakha 61 and Sakha 93 of 5.97 and 5.98 (g/plant).
- Dry plant weight was increased with increasing nitrogen levels.
- The highest daily increase of Gimiza 9 was (138 mg/day) at 97-111 days period, Sakha 61 was (97 mg/day) at 69-83 days period, Sakha 93 was (102 mg/day) at 83-97 days period and Giza 168 was (140 mg/day) at 61-69 days periods.
- Nitrogen % was higher in the first growth period and decreased with time and was increased with increasing the nitrogen levels.
- Giza 168 had the highest nitrogen uptake (145.27 mg N/plant) there was no significant difference between Gimiza 9, Sakha 61 and Sakha 93.
- Nitrogen uptake was increased from 71.16 to 129.04, 158.18 and 173.3 (mg N/plant) with increasing the nitrogen levels from 0 to 30, 60 and 90 kg N fed.$^{-1}$ respectively.
- Gimiza 9 absorbed 23.57% of total nitrogen uptake at tillering, 46.12% at head development stage and 30.32% at flowering stage.
- Sakha 61 absorbed 26.06%, 49.19% and 24.76% from total nitrogen uptake at tillering, head development and flowering stages, respectively.
- Sakha 93 absorbed 23.55%, 42.22% and 34.23% from total nitrogen uptake at tillering, head development and flowering stages, respectively.
- Giza 168 absorbed 22.54%, 46.34% and 31.12% from total nitrogen uptake at tillering, head development and flowering stages, respectively.

Keywords: Wheat varieties, N fertilization, N uptake.

INTRODUCTION

Wheat (*Triticum aestivum*, L.) is one of the most strategic cereal crops in the world as well as in Egypt. Its grain properties make it the main leading cereal as human food. The increasing demand of wheat is mainly due to the fast growth of human population. Hence there are augment need to increase wheat production, therefore, high yielding varieties and balanced manuring are the main factors of increasing its productivity. It is quite known

that nitrogen fertilization greatly affect wheat productivity. Hence, results of many researchers that achieved in Egypt revealed that, nitrogen fertilizer levels significantly affected most of plant growth traits, yield and its component. The optimum nitrogen fertilizer level for wheat vary widely in amounts ranged between 70 and 120 kg N fed.$^{-1}$. according to environmental conditions (Atta Allah and Mohammed, 2003; Saleh, 2003; Tammam and Tawfils, 2004; Allam, 2005; Gab-Allah, 2005; Salem, 2005; Seadh and Badawi, 2006; Mowafy, 2008; and Mansour and Bassiouny, 2009). Application of very high nitrogen rate can reduce grain yield by increasing lodging and disease incidence. Improving the congruence between crop nitrogen short term uptake requirements during the growing season and the available nitrogen supply from indigenous and applied nitrogen, can result in greater nitrogen use efficiency.

Presumably this tactical minimizes the amount of excess inorganic nitrogen that is vulnerable to loss processes. Knowledge of wheat nitrogen requirements and uptake capacity are therefore fundamental to the development of improved nitrogen management on wheat, just as they are for other crops (Baethgen and Alley, 1989; and Peng and Cassman, 1998). Peng and Cassman (1998) found that peak N uptake rates appear to occur between mid-tillering and panicle initiation stages of rice.

The objectives of the present study is to investigate the response curve of four wheat varieties to nitrogen element and determination of nitrogen fertilizer amount needed during the different growth stage periods.

MATERIALS AND METHODS

A field experiment was conducted at Sakha Agricultural Research Station farm during the winter season of 2008/2009, to assess the response curve of wheat to the nitrogen element at Northern Delta region (31^{o}05' N latitude and 30^{o}56' E longitude). Four wheat varieties were used, Gemiza 9, Sakha 61, Sakha 93 and Giza 168. The experimental soil was prepared by suitable plowing and land leveler. The recommended grains weight from each wheat variety (60 kg fed.$^{-1}$) were sowed by seed planter, 20 cm between the lines on 19th November. Split plot design was used for layout the experiment with four replicates. The main plots were randomly assigned by the four wheat varieties, and the subplots were randomly assigned by four nitrogen levels i.e. zero (N_0), 30 kg N fed.$^{-1}$ (N_{30}), 60 kg N fed.$^{-1}$ (N_{60}) and 90 kg N fed.$^{-1}$ (N_{90}) (ha.=2.4 fed.). The sub plot area was 12 m^2, 3 m in width (15 wheat lines), and 4 m in length. The previous crop was corn. Phosphorus fertilization was added at the rate of 15.5 kg P_2O_5 fed^{-1} in the form of single superphosphate 15 % P_2O_5 during the soil preparation (P_2O_5 = 2.29 x P). Potassium fertilization was added at the rate of 24 kg K_2O fed.$^{-1}$ in one dose, with the first irrigation in the form of potassium sulphate 48% k_2O (k_2O = 1.2 x K) . Nitrogen fertilization was added at two equal doses with the first and second irrigations in the form of urea 46.5% N. Composite soil sample was collected from the experimental soil, prepared to determine some soil properties according to Black *et al*. (1965). Some physical and chemical

characteristics are presented in Table (1). Eight plant samples were collected from each subplot during the main stages of growth period i.e, 30, 40, 61, 69, 83, 97 and 111 days from sowing. The samples were constant number of plants from each plot (4 plants). The plant samples were washed thoroughly by the distilled water. After the washing, fresh plant weight was detected. The samples were oven dried at 70^{o}C for 24 hours. The dry plant weight was determined. Crop growth rate (CGR) defined as the dry matter increase with time was noticed according to Radford (1965) using the formula:

$$CGR = (W_2-W_1)/(T_2-T_1) \text{ gram/plant,}$$

where,

W_1, W_2, refer to total dry weigh at times, T_1, T_2, respectively. Plant samples were wet digested using sulphuric and perchloric acids, total nitrogen was determined in the plant samples digestion by the microkjldahel method according to Jackson (1967). Nitrogen uptake was calculated by multiplying the nitrogen concentration by the dry matter as follow:

$$\text{N uptake (g)} = \frac{\text{N\% x plant dry matter yield}}{100} \text{ (g)}$$

N-uptake during the physiological stages was calculated. The obtained results were statistically analyzed using MSTATC computer program.

Table 1: Some physical and chemical soil properties of the experimental site.

Particle size distribution			Texture	pH*	EC** dSm^{-1}	O.M. %	Available nutrients mg kg^{-1}		
Sand%	Silt %	Clay %					N	P	K
4.9	33.1	62.0	Clayey	8.0	0.53	1.87	21.0	5.5	200

*** pH in 1:2:5 soil: water suspension**
**** EC in 1:5 soil water extract**

RESULTS AND DISCUSSION

Data presented in Table (2) showed that up to 30 days from sowing no significant differences between the used wheat varieties in the dry plant weight. After 40 days from sowing, there were significant differences in dry plant weight between the used varieties. Gimiza 9 and Giza 168 had the same plant dry weight (0.70 g) which was higher than the others. After 50 days from sowing, differences between the varieties were highly significant. The highest plant dry weight value of 1.33 g $plant^{-1}$ was obtained with Sakha 61, while no significant differences between the other three varieties was found. Up to 97 days from sowing the differences were highly significant. The highest dry plant weight was obtained with Sakha 61 and Giza 168 without significant differences between them. After 111 days from sowing (full flowering) Giza 168 and Gimiza 9 had the highest dry plant weight without significant difference between them, Sakha 61 and Sakha 93 had the lower values without significant difference between them. From these results, it is clear that the differences between (Giza 168, Gimiza 9) and (Sakha 61,

Sakha 93) in the dry plant weight may be due to the breeder aim where the first two varieties were higher in the vegetative growth compared to the other two varieties.

Table 2: Dry plant weight (g) during the growth periods as affected by wheat variety.

Variable	Plant age (day)							
	30	40	50	61	69	83	97	111
Gimiza 9	0.18	0.70	1.02	1.96	2.52	3.84	4.71	6.64
Sakha 61	0.20	0.60	1.33	2.03	2.76	4.11	5.10	5.97
Sakha 93	0.21	0.65	1.00	2.00	2.70	3.24	4.66	5.98
Giza 168	0.22	0.70	0.91	1.81	2.93	4.10	5.13	6.95
F. test	N.S.	*	**	N.S	**	**	**	**
L.S.D. 0.05	-	0.10	0.15		0.37	0.30	0.35	0.40

Results in Table (3) revealed that dry plant weight was highly significant increased by increasing nitrogen levels, in all the collected samples except that after 30 days from sowing, it was non significant. Values of the increase in plant dry weight with different nitrogen levels showed that, increasing nitrogen levels up to 90 kg fed.$^{-1}$ led to increase the plant weight, where increasing nitrogen levels from 0 to 30 kg fed.$^{-1}$ led to increase the values of the dry plant weight by about 14.3%, 33.78%, 29%, 27%, 16.8%, 23.6% and 32.9% at(30-40),(40-50),(50-61),(61-69),(69-83),(83-97)and(97-111) days from sowing periods, respectively. In the same periods increases in the dry plant weight due to increasing nitrogen levels from 30 to 60 kg /fed. were 9.38%, 18.9% , 11.42%, 10.5%, 15.9%, 14.7% and 10.7%, respectively, while increases due to increasing nitrogen levels from 60 to 90 kg N/fed. were 7.14% , 6.8%, 16.9%, 23.6%, 14.6%, 13.2% and 7.29%, respectively. This showed that the growth response was decreased with increasing the nitrogen levels. On the other hand, the highest response to the highest nitrogen levels were at the period from (61-97) days. This may be due to presence of available nitrogen up to this periods with the high nitrogen level. Similar results were reported by Seadh and Badawi (2006) and Mansour and Bassiouny (2009).

Table 3: Dry plant weight (g) during the growth periods as affected by the nitrogen rates.

Variable	Plant age (day)							
	30	40	50	61	69	83	97	111
N_0	0.20	0.56	0.74	1.31	1.92	2.84	3.49	4.32
N_{30}	0.20	0.64	0.99	1.86	2.64	3.47	4.57	6.44
N_{60}	0.20	0.70	1.22	2.10	2.95	4.13	5.36	7.13
N_{90}	0.20	0.75	1.31	2.53	3.39	4.84	6.18	7.65
F. test	N.S.	**	**	**	**	**	**	**
L.S.D. 0.05	-	0.16	0.04	0.18	0.21	0.04	0.07	0.06

Data presented in Table (4) showed that the daily increase of the dry matter was highly significant differed between the varieties. The highest daily increase of Gimiza 9 (138 mg/plant/day) was recorded in the period of (97-

111) day from sowing. While, in Sakha 61 the highest daily increase was recorded in the period of (69-83) day (97 mg/plant/day). In Sakha 93, the highest daily increase (102 mg/plant/day) was recorded in the period of (83-97 day from sowing). But the highest daily increase in Giza 168 (140 mg/plant/day) was recorded in the period of (61-69) day from the sowing. Such results showed that the varieties (Gimiza 9, Sakha 93 and Giza 168) showed high increase of the daily increase after irrigation and but was decreased before the following irrigation. On the contrary, Sakha 61 decreased after irrigation and daily increase was increased before the following irrigation. This may be due to the differences between the varieties in the root volume and the root surface area. In addition, Sakha 61 had high ability for water absorption. Similar results were reported by Campbell *et al*., (1977) and Comfort *et al*. (1988) who suggested that wheat cultivars with deeper penetrating roots may affect the extent and depth of N and soil water by a plant, and access residual sub-soil NO_3 reserves during grain filling, which can result in higher grain protein concentration.

Table 4: Daily increase of the dry matter of wheat varieties during the growth period (mg/plant/day).

Variable	Daily increase during the growth periods (mg/day/plant)							
	0-30	30-40	40-50	50-61	61-69	69-83	83-97	97-111
Gimiza 9	6.0	52.0	32.0	85.0	70.0	94.0	62.0	138
Sakha 61	6.7	40.0	74.0	64.0	91.0	97.0	71.0	62
Sakha 93	7.0	44.0	35.0	91.0	88.0	39.0	102.0	94
Giza 168	7.3	48.0	21.0	82.0	140.0	83.0	75.0	129
Mean	6.8	46.0	41.0	81.0	97.0	78.0	78.0	106.0
F. test	**	*	**	**	**	**	**	**
L.S.D. 0.05	0.35	11.81	8.92	11.6	12.73	10.59	10.20	12.29

Results in Table (5) and Fig. (1) revealed that increasing nitrogen levels from 0 up to 90 kg N fed^{-1} led to gradual increase of daily increase (mg/plant/day) up to 97 day from sowing. Period from 97 to 111 days, the daily increase was high in the low nitrogen level then was decreased gradually with increasing the nitrogen level. Under (N_{30}) the daily increase was 134 mg/plant/day, while, it was 126 and 105 mg/plant/day with (N_{60}) and (N_{90}), respectively. This may be due to that growth rate under the low nitrogen level was less to long period. On the other hand the high nitrogen level increased the growth rate in the first period, which led to decrease in the late period. Similar results were reported by Comfort *et al*. (1988) who suggested that high rates of N fertilization may inhibit deeper root growth and hence decrease the potential use of deeper soil NO_3 and water reserves.

Data presented in Table (6) showed that all used wheat varieties had high nitrogen percentage in the first growth period, and was gradually decreased with the steps of growth periods. The highest N% values of 3.71, 3..99, 4.48 and 4.48% were obtained at (0-30) day period with Gimiza 9, Sakha 61, Sakha 93 and Giza 168, respectively. While, lowest values (1.07, 1.21, 1.12 and 1.21%) were recorded at (97-111) day period with Gimiza 9, Sakha 61, Sakha 93 and Giza 168, respectively. The differences in N%

between the varieties were significant in the first and last periods and high significant in the mid periods. The decrease in N% with the time may be due to increasing the vegetative growth and dilution effect.

Table 5: Daily increase of the dry matter of wheat varieties due to nitrogen levels during the growth period (mg/plant/day).

Variable	Daily increase during the growth periods (mg/day/plant)							
	0-30	30-40	40-50	50-61	61-69	69-83	83-97	97-111
N_0	6.8	36.0	18.0	52.0	76.0	66.0	47.0	59.0
N_{30}	6.8	44.0	35.0	80.0	98.0	59.0	79.0	134.0
N_{60}	6.8	50.0	52.0	80.0	106.0	85.0	88.0	126.0
N_{90}	6.8	55.0	56.0	110.0	109.0	104.0	95.0	105.0
Mean	6.8	46.0	40.0	81.0	97.0	79.0	77.0	106.0
F. test	N.S.	**	**	**	**	**	**	**
L.S.D. 0.05	-	2.64	1.58	1.77	2.23	2.47	3.30	3.29

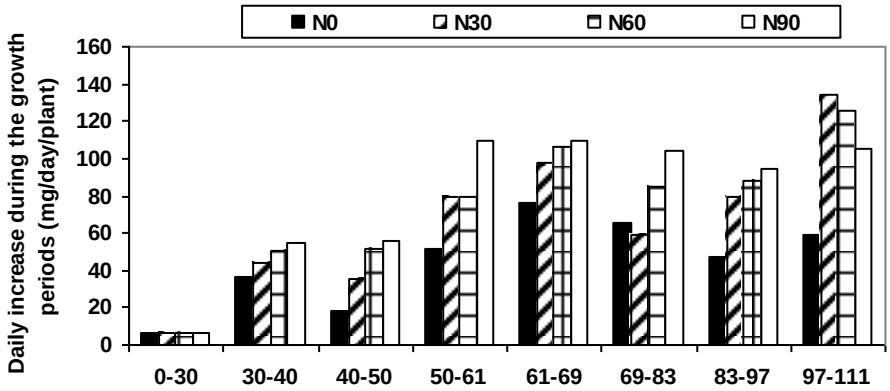

Fig. 1. Daily increase of the dry matter of wheat varieties due to nitrogen levels during the growth period (mg/plant/day).

Table 6: N% during the growth periods of wheat varieties.

Variable	Growth periods (day)							
	0-30	30-40	40-50	50-61	61-69	69-83	83-97	97-111
Gimiza 9	3.71	3.36	2.98	2.56	2.10	1.47	1.42	1.07
Sakha 61	3.99	3.64	2.91	2.87	2.10	1.72	1.65	1.21
Sakha 93	4.48	3.13	2.73	2.52	2.10	1.25	1.18	1.12
Giza 168	4.48	3.52	2.80	2.61	1.96	1.82	1.40	1.21
Mean	4.17	3.41	2.86	2.64	2.07	1.57	1.41	1.15
F. test	*	**	**	**	N.S.	**	N.S	*
L.S.D. 0.05	0.65	0.20	0.28	0.22	-	0.15	-	0.14

Results in Table (7) and Fig. (2) showed that nitrogen concentration in wheat varieties was highly significant affected by the nitrogen levels. In most growth periods, nitrogen concentration increased with increasing nitrogen levels. In the period of 0 to 61 days increasing the nitrogen levels up to 60 kg fed.$^{-1}$ led to dramatic increase of nitrogen concentration in the dry

matter, while the increase with 90 kg N fed.$^{-1}$ level was less than with 60 kg N/fed.$^{-1}$. After 61 days from sowing, increasing the nitrogen levels up to 90 kg fed.$^{-1}$ increased N% in wheat dry matter. This may be due to the nitrogen in the soil was high than the plant needs under 90 kg N fed.$^{-1}$ in the first period, while in the last periods, the available nitrogen in the soil was less under the low levels and was enough in the high level. With respect to the relationship between the nitrogen concentration of wheat dry matter and the growth periods, in the first period, the N% was high and gradually decreased with the time. The mean values of N% were 4.17, 3.41, 2.92, 2.7, 2.09, 1.72, 1.43 and 1.15% with the periods of (0-30), (30-40), (40-50), (50-61), (61.69), (69-83), (83-97) and (97-111) days from sowing, respectively. This may be due to the increase in vegetative growth and nitrogen dilution effect.

Table 7: Effect of N levels on N% of wheat varieties during the growth periods.

Variable	Growth periods (day)							
	0-30	30-40	40-50	50-61	61-69	69-83	83-97	97-111
N_0	4.17	3.01	2.29	2.08	1.37	1.26	1.06	0.86
N_{30}	4.17	3.48	3.13	3.06	1.82	1.73	1.47	1.17
N_{60}	4.17	3.64	3.17	2.85	2.43	1.89	1.58	1.40
N_{90}	4.17	3.51	3.08	2.80	2.75	2.01	1.61	1.17
Mean	4.17	3.41	2.92	2.70	2.09	1.72	1.43	1.15
F. test	N.S.	**	**	**	**	**	N.S.	**
L.S.D. 0.05	-	0.041	0.058	0.13	0.19	0.13	-	0.092

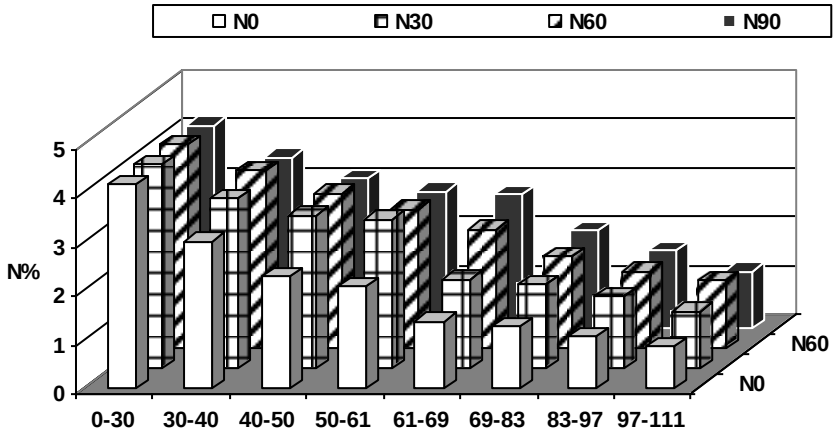

Fig. 2: Effect of N levels on N% of wheat varieties during the growth periods.

Data presented in Table (8) showed that there were significant differences in nitrogen uptake (mg/plant/day) between the examined wheat varieties. Gimiza 9 had the highest nitrogen uptake value of 1.79 and 2.69 (mg N/plant/day) through the periods of (30-40) and (50-61) days from

sowing, respectively. These periods were just after fertilization. Highest nitrogen uptake values for Sakha 61 variety, values 2.15 and 1.9 (mg N/plant/day) were obtained in the periods of (40-50) and (61-69) days from sowing. These periods were the second half of the intervals (between the first and second irrigation) and (the second and third irrigation). This means that Sakha 61 was able to absorb water and fertilizer under high water retention compared with the other examined wheat varieties. Sakha 93 had the highest nitrogen uptake values of 2.47 and 2.11 (mg N/plant/day) at the periods of (50-61) and (83-97) days from sowing, respectively. Such results showed that Sakha 93 absorbed the nitrogen fertilizer along growth periods. Highest nitrogen uptake values of 2.53 and 3.19 (mg N/plant/day) for Giza 168 wheat variety were obtained in (50-61) and (61-69) days from sowing, respectively. Results of some investigations showed that wheat cultivars differed in their response to N fertilization (Aly and El-Bana, 1994 and Atta Allah and Mohammed, 2003).

Table 8: N uptake of wheat varieties during the growth periods (mg/plant/day).

Variable	Growth periods (day)							
	0-30	**30-40**	**40-50**	**50-61**	**61-69**	**69-83**	**83-97**	**97-111**
Gimiza 9	0.22	1.79	0.97	2.69	1.55	1.35	0.95	1.41
Sakha 61	0.27	1.46	2.15	1.79	1.90	1.63	1.24	0.75
Sakha 93	0.32	1.40	0.89	2.47	1.99	0.51	2.11	1.72
Giza 168	0.33	1.69	0.58	2.53	3.19	1.17	1.38	1.69
F. test	*	**	**	**	**	**	**	**
L.S.D. 0.05	0.10	0.13	0.14	0.15	0.17	0.16	0.17	0.14

Data presented in Table (9) showed that increasing the nitrogen fertilizer levels led to increase nitrogen uptake in all the noticed periods. Increasing the nitrogen levels from 0 to 30, 60 and 90 kg N fed.$^{-1}$ led to increase the nitrogen uptake from 1.07 to 1.53, 1.81 and 1.93 (mg N/plant/day), respectively at 30-40 days period. At (40-50) days period, the nitrogen uptake was increased from 0.43 to 1.10, 1.52 and 1.55 (mg N/plant/day). At (50-61) days period, nitrogen uptake was increased from 1.08 to 1.94, 2.54 and 3.4 (mg N/plant/day) with increasing nitrogen fertilizer levels from 0 to 30, 60 and 90 kg N fed^{-1}. At (61-69) days period, the increase due to increasing the nitrogen fertilizer levels were from 1.25 to 1.787, 2.56 and 3.04 (mg N/plant/day). At (69-83) days period, the increases were from 0.69 to 0.88, 1.38 and 1.70. While, increases were 0.65 to 1.41, 1.71 and 1.92 (mg N/plant/day) at (83-97) days periods. At the last sample (97-111) days period, increases of nitrogen uptake were 0.54 to 1.50, 1.77 and 1.26 (mg N/plant/day). In general, it is clear that increasing nitrogen fertilizer levels led to increase nitrogen uptake by plants. Also, results indicated that nitrogen uptake increased at the times of the fertilizer application and times of irrigation, due to presence of available nitrogen in the root zone and to translocation of the nitrogen fertilizer to the root by mass flow.

Table 9: Effect of N levels on N uptake by wheat varieties during growth periods (mg/plant/day).

Variable	Growth periods (day)							
	0-30	30-40	40-50	50-61	61-69	69-83	83-97	97-111
N_0	0.29	1.07	0.43	1.08	1.25	0.69	0.65	0.54
N_{30}	0.29	1.53	1.10	1.94	1.77	0.88	1.41	1.50
N_{60}	0.29	1.81	1.52	2.54	2.56	1.38	1.71	1.77
N_{90}	0.29	1.93	1.55	3.40	3.04	1.70	1.92	1.26
Mean	0.29	1.59	1.15	2.24	2.15	1.16	1.42	1.43
F. test	N.S	**	**	**	**	**	**	**
L.S.D. 0.05	-	0.14	0.13	0.10	0.08	0.09	0.12	0.10

Data presented in Table (10) revealed that differences between the used wheat varieties in nitrogen uptake were highly significant in the tillering, head development and flowering stages. Head development stage had the highest nitrogen uptake values in all varieties comparing to the other stages. Gimiza 9 absorbed 23.57% of the total nitrogen uptake during the tillering (0-45 days after sowing), 46.12% during head development stage (45-80) and 30.32% during the flowering stage (80-110). Sakha 61 absorbed 26.06% from total N uptake during tillering stage, 49.19% during the head development stage and 24% during the flowering stage. While Sakha 93 absorbed 23.55% during the tillering, 42.22% during the head development stage and 34.23% during the flowering stage. Giza 128 absorbed 22.54% during the tillering stage, 46.34 during the head development stage and 31.12% during the flowering stage. Results in Table (10) showed that Giza 168 had the highest total nitrogen uptake of 145.27 mg N/plant. This means that Giza 168 has high response to the nitrogen fertilization compared to other varities and/or has high efficient in the nitrogen uptake. Sakha 61 absorbed high nitrogen in the tillering and head development stages compared to the others, this mean that it needed all the nitrogen fertilizer early. On the other hand, Sakha 93 was opposite to Sakha 61, thus Sakha 93 must be fertilized later to obtain good yield .

Table 10: N-uptake % during the physiological stages of wheat varieties (mg/plant).

Variable	Nitrogen uptake (mg/plant)						
	Tillering 0-45	% from total	Head development 45-80	% from total	Flowering 80-110	% from total	Total uptake
Gimiza 9	29.36	23.57	61.73	46.12	37.00	30.32	128.08
Sakha 61	33.41	26.06	63.43	49.19	32.77	24.76	129.59
Sakha 93	27.93	23.55	53.10	42.22	47.62	34.23	128.74
Giza 168	29.71	22.54	69.01	46.34	46.55	31.12	145.27
F. test	**	*	**	**	**	**	**
L.S.D. 0.05	3.48	2.74	4.20	4.48	5.29	3.56	7.34

Data presented in Table (11) showed that the nitrogen uptake was increased as nitrogen fertilizer levels increased. Nitrogen uptake was

increased from 71.16 (mg/plant) to 129.04, 158.18 and 173.3 with increasing the nitrogen levels from 0 to 30, 60 and 90 kg N fed.$^{-1}$, respectively. Highest nitrogen uptake values were recorded during the head development stage under all the nitrogen levels. During the tillering stage increasing, the nitrogen level led to decrease the nitrogen uptake % from the total N uptake. While, in the head development, it was slightly increased.

Table 11: N-uptake% during the physiological stages (mg/plant) of wheat varieties.

Variable	Nitrogen uptake (mg/plant)						
	Tillering 0-45	% from total	Head development 45-80	% from total	Flowering 80-110	% from total	Total uptake
N_0	21.35	30.24	31.53	44.02	18.28	25.74	71.16
N_{30}	29.33	22.88	56.45	44.20	43.26	32.92	129.04
N_{60}	34.24	21.98	71.13	44.82	52.82	33.20	158.18
N_{90}	35.48	20.61	88.17	50.82	49.66	28.57	173.30
Mean	30.10	23.93	61.82	45.97	41.01	30.11	132.92
F. test	**	**	**	**	**	**	**
L.S.D. 0.05	0.66	0.52	1.14	0.61	6.00	0.61	1.51

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استجابة بعض أصناف القمح لمستويات التسميد النيتروجينى وأثرها على امتصاص النيروجين

رمضان إسماعيل كنانى ، عاطف صبحى محمود السعدى و رجب حجازى عطيه
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نفذت تجربة حقلية بمزرعة محطة البحوث الزراعية بسخا ـ محافظة كفرالشيخ ـ مصر خلال الموسم الشتوى 2008-2009م لتقدير استجابة بعض أصناف القمح لمستويات التسميد النيتروجينى وتقدير الوزن الجاف للنبات والزيادة اليومية في الوزن الجاف والنسبة المئوية للنيتروجين بالمادة الجافة والنيتروجين الممتص خلال فترات النمو المتتالية والنيتروجين الممتص خلال الأعمار الفسيولوجية المختلفة. استخدم تصميم القطع المنشقة فى أربع مكررات. شغلت القطع الرئيسية بأربعة أصناف قمح هى: جميزه 9 ، سخا 61 ، سخا93 وجيزة 168 كما شغلت القطع الشقية بأربعة مستويات نيتروجين هى: صفر ، 30 ، 60 و 90كجم ن/فدان (هكتار = 2.4 فدان). تم جمع ثمان عينات نباتية خلال فترات النمو المتتالية لتقدير الصفات السابقة

ويمكن تلخيص النتائج المتحصل عليها فيما يلي:

- كان أعلى وزن جاف للنبات مع جميزة 9 هو 6.94 جم/نبات ومع جيزة 168 هو6.95 جم/نبات. و كان الأقل مع سخا 61 هو5.97 جم/نبات ومع سخا 93 هو5.98 جم/نبات.
- أدت الزيادة في مستويات التسميد النيتروجينى إلى زيادة الوزن الجاف للنبات.

- كانت أعلى زيادة يومية لصنف جميزة 9 هي 138 ملجم/يوم خلال الفترة من 97-111 يوما ، ومع سخا 61 هي97 ملجم/يوم في الفترة من 69-83 يوما ، ومع سخا 93 هي102 ملجم/يوم خلال الفترة من 83-93 يوما ومع جيزة 168 هي140 ملجم/يوم خلال الفترة 61-96 يوما.
- كانت النسبة المئوية للنيتروجين بالمادة الجافة عالية في المراحل الأولى وتناقصت بتقدم عمر النبات كما لوحظ زيادة النسبة المئوية للنيتروجين بالمادة الجافة بزيادة مستوى التسميد النيتروجينى.
- أعطى صنف جيزة 168 أعلى امتصاص للنيتروجين (145.27 ملجم ن/نبات) ولا توجد فروق معنوية بين الأصناف الثلاثة الأخرى.
- أدت زيادة التسميد النيتروجينى من صفر إلى 30 ثم 60 ثم 90 وحدة نيتروجين للفدان إلى زيادة امتصاص النيتروجين من 71.16 إلى 129.04 ، 158.18 ، 173.3 ملجم ن/نبات.
- امتص صنف جميزة 9 نسبة 23.57 ، 46.57 ، 30.32% من النيتروجين الممتص الكلى فى مراحل التفريع وتكوين السنابل والتزهير على التوالي.
- امتص صنف سخا61 نسبة 26.06, 49.19, 24.76%. من النيتروجين الممتص الكلى خلال مراحل التفريع وتكوين السنابل والتزهير على التوالى.
- امتص صنف سخا 93 نسبة 23.55 ، 42.22 ، 34.23% من النيتروجين الممتص الكلى خلال مراحل التفريع وتكوين السنابل والتزهير على التوالى.
- امتص صنف جيزة 168نسبة 22.54 ، 46.34 ، 31.12% من النيتروجين الممتص الكلي خلال مراحل التفريع وتكوين السنابل والتزهير على التوالى.

قام بتحكيم البحث

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