Effect of Varieties and Nitrogen Fertilization on the Growth of yield *XTriticosecale wittmack*

AL-hakam Maamoun Rashid & M.A.Abdul-Alwahid

Agriculture Directorate of Basrah, Ministry of Agriculture, Iraq

alhakammaamon@gmail.com &mohameed.abdl_wahed@uobasrah.edu.iq*

Abstract:

A field experiment was conducted at the Agricultural Research Station / College of Agriculture, University of Basra / Karma Ali site in the soil of the Grené mixture, during the winter agricultural season 2022-2023 , with the aim of studying the effect of varieties and nitrogen fertilization on the growth of the triticale *crop triticosecale wittmack X*. The study included three varieties (Farah, Amal, Muhannad) , And four levels of nitrogen fertilizer: 0, 100, 120 and 140 kg ha^{-1}. The experiment was applied according to the method of factor experiments using the of randomized complete block design (R.C.B.D) with three replicates. Some growth characteristics were studied,include plant height, flag leaf area and number of tiller and the biological yield and the protein yield . The varieties differed significantly in some of the characteristics of the study, as the variety gave Amal variety the highest average height of the plant and the area of the flag paper and the number of of tiller and the biological and the protein yield and amounted to 100.13 cm and 52.92 cm^{2} and 615.5 tiller. m^{2} and 22.75 Mg ha^{-1} and 0.821 Mg ha^{1-} respectively. The results showed that the increase in nitrogen fertilizer levels led to an increase in growth characteristics, as the level achieved 140 kg N hectare $^{1-}$ the highest average height of the plant, the area of the flag leaf, the number of tiller and the length of the spike amounted to 106.61 cm and 50.40 cm^{2}, 704.8 m^{2} and 11.38 cm respectively.

Research extracted from the master's thesis of the first researcher

Keywords : Varieties , Nitrogen fertilization , Tritical

Introduction:

Tritical *Triticosecale wittmack X* is a man-made cereal crop belonging to the Poaceae family and represents the fruitful attempt of scientists to obtain a crop that combines the qualities of wheat and rye by doubling the chromosomes of the hybrid. As he inherited from the wheat crop *(Triticum aestivum)* high yield ability and resistance to diseases and inherited from *the rye (Secale cereal*) durability and the ability to survive through its tolerance to inappropriate conditions such as poor soils and little drainage, tritical is similar to wheat in appearance, but it surpasses it in plant size, spike, yield and protein (10).

For the purpose of expanding the cultivation of this crop by increasing its

ISSN 2072-3857

productivity, modern technologies are used, including the introduction of new varieties that are characterized by high production, as the genetic structures and the extent of their suitability for cultivation in different regions are factors that affect modern agriculture through their direct impact on the conditions of the region and their reflection on growth qualities. (11,1,6) pointed to the variation of varieties among them in growth characteristics. The production capacity of any plant depends on the service processes that are applied in the field taking into account the appropriate environmental conditions for growth and one of these operations is the interest in fertilization operations as it is one of the important production factors to provide what the plant needs from these elements and increase agricultural production and improve its quality, especially major elements such as nitrogen, as it is one of the elements that have an important role in increasing cell division and expansion , which is reflected positively in increasing the height of the plant and the tiller, which leads to an increase in Root and vegetative total (7) , The use of adequate levels of nitrogen fertilizer increases the height of the plant, the length of the spike, the area of the flag leaf and the number of tiller (3).

Materials and methods

A field experiment was carried out during the winter agricultural season 2022-2023 at the Agricultural Research and Experiments Station of the College of Agriculture / University of Basra, Karma Ali site, which is located at a latitude of 30.57 N and a length of 47.8 to study the effect of varieties and nitrogen fertilization on the growth, yield and components of tritical (X *triticosecale wittmack*). in alluvial clay mixed soils shown in Table (1). The experiment included a study of two factors, the first factor is three varieties of wheat crop, (Farah, Muhannad and Amal), and the second factor is four levels of nitrogen fertilizer (0, 100, 120 and 140) kg N hectare $^{1-}$ which is symbolized by (N0, N 1 , N2 and N3) respectively and the source of nitrogen fertilizer is urea fertilizer, which contains (46%) nitrogen. The experiment was applied in the method of factorial experiments (Factorial Experiment) using the design of the randomized complete block design (R.C.B.D) and three repeats, and distributed different factor coefficients randomly within each sector, thus the total experimental units (3 x 4 x (3) equals (36 experimental units). The land was divided according to the design used into three blocks and then divided into panels with dimensions (2 x 2) Each block contains 12

ISSN 2072-3857

Experimental unit, and thus the total number of experimental units became 36 units, the area of the experimental unit is 4 m 2 with dimensions of (2x2) meters. Seeds of tritical were sown for varieties on 1/11/ 2023 and at a seeding rate of 120 kg hectare $^{1-}$ Agriculture was on the lines of the distance between the lines and the last 15 cm (8).

Table (1) Some Chemical and Physical Properties of Experimental Soil

Adjective		Value	Unit
pH		7.38	-
E.Ce		8.65	Desi Siemens $^{M-1}$
Organic matter		10.5	g kg^{-1}
Items Prefab	N	53.0	mg kg^{-1} soil
	P	4.86	
	K	125	
Soil separators	Sand	369	g kg^{-1} soil
	Silt	536	
	Clay	95	
texture	Chay loam		

Results and discussion

Plant height (cm)

It is noted from Table (2) that the increase in nitrogen fertilizer levels from 0 to 140 kg N ha 1 - led to a significant increase in this characteristic, as the fertilizer level gave 140 kg N ha $^{1-}$ (N3) the highest average plant height reached 106.61 cm while the non-addition treatment recorded 0 kg N hectare1- (N0) the lowest average plant height reached 86.67 cm, The reason for increasing the height of the plant by increasing nitrogen fertilization levels may be attributed to the role of nitrogen in increasing the growth and division of cells, the elongation of phalanges and the formation of amino acids necessary in the elongation of plant cells, including tryptophan, which is responsible for the formation of the basic substance for the construction of auxin, which affects the division of plant cells. This result agreed with many researchers who pointed out that increasing the level of added nitrogen led to an increase in plant height characteristic (12 , 3)

ISSN 2072-3857

Table (2) Effect of varieties and nitrogen fertilization and their overlap on the interaction characteristic of plant height (cm)

varieties	Nitrogen fertilization (kg N ha^{-1})				Average varieties
	N0	N1	N2	N3	
Farah	**86.77**	**93.60**	**100.67**	**107.90**	**97.23**
Amal	**88.27**	**97.07**	**105.00**	**110.20**	**100.13**
Muhannad	**84.97**	**96.73**	**99.00**	**101.73**	**95.61**
Average fertilizer	**86.67**	**95.08**	**101.55**	**106.61**	
L.S.D	**N**		**V**		**N*V**
0.05	**3.83**		**N.S**		**N.S**

Flag leaf area (-cm2)

It is noted from Table (3) that the Amal variety outperformed the rest of the varieties included in the study in the average area of the flag leaf by giving it the highest average of 52.92 cm 2, while the Muhannad variety recorded the lowest average for this trait amounted to 37.76 cm 2, and the superiority of the Amal variety is due to the efficiency of its high physiological and genetic ability to exploit the requirements of growth better than other varieties. In addition to the difference in their genetic composition, which leads to the difference in the nature of growth and the ability to photosynthesize and the processing of nutrients necessary for growth, and the expansion of the science paper as a result of the genetic difference between the varieties, and this result is consistent with the findings (4, 1, 2) who indicated that there are significant differences between the varieties in the area of the flag paper. The results of Table (3) indicated the significant superiority of nitrogen fertilizer levels in the area of the flag paper, as the level of 140 kg N hectare 1- (N3) achieved the highest average of 50.40 cm 2 while the non-addition treatment N0 recorded the lowest average of 37.63 cm 2, and perhaps the reason for this is that increasing the levels of nitrogen fertilizer works to increase the pigment of chlorophyll in the leaves, which in turn leads to an increase in the efficiency of photosynthesis. This in turn is reflected positively in the leaf area of the plant, and this finding is consistent with the findings of (5, 9) who found that increased levels of nitrogen fertilizer lead to an increase in the area of the flag leaf. It is noted from the results of Table (3) that the overlap

ISSN 2072-3857

between the varieties and the levels of nitrogen fertilizer was significant in this capacity, as the variety Amal recorded with the level of 140 kg N hectare $^{1-}$ N3) the highest area of the flag paper amounted to 62.33 cm 2 while the non-addition treatment with the variety Muhannad recorded the lowest area of the flag paper amounted to 29.57 cm 2.

Table (3) Effect of varieties and nitrogen fertilization and the interaction between them on the average trait of the flag leaf (cm2)

varieties	Nitrogen fertilization (kg N ha^{-1})				Average varieties
	N0	N1	N2	N3	
Farah	**36.77**	**42.63**	**41.87**	**47.57**	**42.21**
Amal	**46.57**	**48.93**	**53.87**	**62.33**	**52.92**
Muhannad	**29.57**	**36.73**	**43.43**	**41.30**	**37.76**
Average fertilizer	**37.63**	**42.77**	**46.39**	**50.40**	
L.S.D 0.05	**N**		**V**		**N*V**
	1.32		**1.15**		**2.30**

Number of tiller (tiller m^{2-})

Table (4) shows the difference of varieties significantly among themselves in the average number of tiller, as the variety outweighed the Amal of giving it the highest average for this trait amounted to 615.5 tiller m^{2-}, while the variety Muhannad recorded the lowest average of 521.2 tiller m^{2}-. The reason for the difference of varieties among themselves in the number of tiller is due to the genetic factor, which is the main factor for the plant's ability to tiller, and this leads to variation of varieties in this trait.. Table (4) shows the difference in nitrogen fertilizer levels among themselves significantly in this capacity and that the increase in the amount of nitrogen added to the soil has given a significant increase in the number of tiller of the tritical crop as the fertilizer level gave 140 kg N ha 1-(N3) the highest average number of tiller amounted to 704.8 tiller m^{-2} while the comparison treatment N0 recorded the lowest average of 417.2 tiller m^{-2} , The reason for the increase in the number of tiller at high levels of nitrogen fertilizer may be due to the positive role of nitrogen in increasing vegetative growth or due to the high availability of nutrients and this leads to an increase in photosynthesis products and then an increase in the number of shoots, in addition to that the availability of nitrogen at the beginning of plant growth encourages the growth of primary and secondary plants and

ISSN 2072-3857

that its availability during the elongation stage leads to a decrease in the rate of death of some plants and their survival, and this leads to an increase in In the number of shoots and the number of leaves, this helps the plant to exploit the light energy falling on it to carry out photosynthesis.

Table (4) Effect of varieties and nitrogen fertilization and the interaction between them on the average characteristic of the number of tiller (tiller m^{-2})

varieties	Nitrogen fertilization (kg N ha^{-1})				Average varieties
	N0	N1	N2	N3	
Farah	**420.0**	**500.7**	**608.1**	**710.4**	**559.8**
Amal	**493.7**	**577.5**	**635.4**	**755.6**	**615.5**
Muhannad	**337.9**	**526.2**	**572.5**	**648.4**	**521.2**
Average fertilizer	**417.2**	**534.8**	**605.3**	**704.8**	
L.S.D 0.05	**N**		**V**		**N*V**
	40.90		**35.42**		**N.S**

Spike length (cm)

The results in Table (5) showed that the level exceeded 140 kg (N ha^{-1}N3) significantly, as the highest average length of the spike was recorded at 11.38 cm, while the comparison treatment recorded the lowest average of 8.51 cm. The reason for the increase in the length of the spike may be attributed to the provision of nitrogen necessary for photosynthesis, and this leads to reducing competition for the products of this process and providing nutrients in sufficient quantity that leads to promoting growth and elongation of cells by increasing the area of the flag leaf that is responsible for photosynthesis, and this result is consistent with the findings of Salem et al. (2016), who indicated that increasing nitrogen levels leads to an increase in spike length.

Table (5) Effect of Varieties and Nitrogen Fertilization and interaction between them on the Average Spike Length (cm)

varieties	Nitrogen fertilization (kg N ha^{-1})				Average varieties
	N0	N1	N2	N3	
Farah	**8.63**	**10.40**	**9.50**	**11.00**	**9.88**
Amal	**8.67**	**10.33**	**9.87**	**11.90**	**10.19**
Muhannad	**8.23**	**9.93**	**9.70**	**11.23**	**9.77**
Average fertilizer	**8.51**	**10.22**	**9.69**	**11.38**	
L.S.D 0.05	**N**		**V**		**N*V**
	0.75		**N.S**		**N.S**

ISSN 2072-3857

Biology yield (Mg h $^{-1}$ **)**

The results of Table (5) showed that the variety Amal achieved the highest average of the biological yield of 22.75 Mg h $^{-1}$ with a significant difference of 14.26% from the variety Muhannad which averaged 19.91 Mg ha^{-1} ,The reason for the variation of varieties in the characteristic of the biological yield is due to their variation in plant height and area of the flag leaf, as well as their ability to form tiller and grain yield (Table 2, 3, 4 and 10).The results of Table (5) showed that the level of fertilizer (140 kgN ha^{1-}N3) recorded the highest average biological yield of 26.78 Mg h $^{-1}$ an increase of 85.97% over the non-addition treatment N0, which recorded the lowest average of 14.40 Mg h $^{-1}$, due to the action of nitrogen in increasing and rising the plant, the area of the flag leaf and the number of tiller (Table 2, 3 and 4) The increase of these components led to an increase in biology yield. As for the effect of the overlap, it has a significant impact on this characteristic, as the variety gave Amal with the fertilizer level of 140 kgN ha $^{1-}$ N3) the highest yield of 30.97 Mg h $^{-1}$, while the overlap between the Muhannad variety with the non-addition treatment gave the lowest biological yield of 13.27 Mg ha $^{1-}$.

Table (6) Effect of varieties and nitrogen fertilization and their interaction on the average biological yield (Mg ha^{-1})

varieties	Nitrogen fertilization (kg N ha^{-1})				Average varieties
	N0	N1	N2	N3	
Farah	**13.47**	**21.33**	**22.33**	**23.19**	**20.14**
Amal	**16.45**	**20.22**	**23.37**	**30.97**	**22.75**
Muhannad	**13.27**	**16.27**	**23.92**	**26.19**	**19.91**
Average fertilizer	**14.40**	**19.27**	**23.20**	**26.78**	
L.S.D 0.05	**N**		**V**		**N*V**
	2.35		**2.03**		**4.07**

7-Protein yield (Mg h $^{-1}$**)**

The results of Table (6) showed that the variety Amal achieved the highest average protein yield of 0.821 Mg h $^{-1}$ an increase of 29.29% over the variety Muhannad, who recorded the lowest average of 0.635 Mg ha $^{1-}$, that the variation of varieties in the characteristic of protein yield may be attributed to genetic differences of varieties

It was noted from the results of Table (6) that the plants to which high levels of nitrogen fertilizer were added achieved the highest

ISSN 2072-3857

average protein yield of 1.017 Mg ha $^{-1}$ compared to the non-addition treatment that recorded the lowest average protein yield 0.427 mg ha $^{-1}$, and the reason for the superiority of the protein yield is due to the effect of nitrogen fertilization, which works to increase the nitrogen content in the plant at high fertilization levels, which leads to an increase in the percentage of protein And grain yield and thus an increase in protein yield.

Table (6) Effect of Varieties and Nitrogen Fertilization and Overlap between Them on the Mean Protein Yield Trait (Mg ha^{1-})

Nitrogen fertilization (kg N ha^{-1})				Average varieties
N0	N1	N2	N3	
0.413	0.563	0.693	1.009	0.670
0.493	0.746	0.863	1.183	0.821
0.376	0.488	0.818	0.860	0.635
0.427	0.599	0.791	1.017	
N		V		N*V
0.08		0.07		N.S

Reference:

1. Al-Dulaimi , Omar Zuhair Abdul Majeed Shukr (2020). The effect of stimulating seeds with salicylic acid and adding humic acid in the growth characteristics and yield of three varieties of tritical. PhD thesis. Faculty of Agriculture - University of Tikrit.
2. Zubaidi, Aqeel Abdul Karim Mutashar (2022) Response of varieties of wheat crop (*Triticum aestivum L*) to spraying with an ethifon growth regulator. Master's thesis. College of Agriculture - University of Basra.
3. Ziyara, Ahmed Jaafar (2023) . Response of growth and yield of genotypes of wheat (*Triticum aestivum L*) to mineral and nano-nitrogen fertilization. PhD thesis. College of Agriculture - University of Basra.
4. Aboudi, Mohammed Odeh Khalaf Basr (2019). Analysis of the genetic stability of wheat varieties (*Triticum aestivum L*) cultivated in different environments of Basra Governorate. PhD thesis. College of Agriculture - University of Basra.
5. Faleh, Faleh Hassan (2015). Effect of levels of N, P and K on the growth and yield of varieties of wheat crop. *Triticum aestivum L* Master thesis, College of Agriculture. University of Basra.

ISSN 2072-3857

6. Al-Morshedy, Hussein Yassin Jabbar (2023). Comparison of the effect of spraying with nanophosphate fertilizer and ground addition of tertiary superphosphate fertilizer on the growth and yield of two genetic structures of wheat (*Triticum aestivum L*). Master's thesis. College of Agriculture - University of Basra.
7. Shati, Raysan Karim, Widad Mahdi Abdul Karim and Khazal Khudair Janabi. (2001) . The role of nitrogen and the amount of seeds in grain yield and its components for genetic structures of wheat and shelmi wheat. Journal of Iraqi Agricultural Sciences Vol. 31(1):173-188.
8. Al-Fahdawi , Hamada Musleh Matar. (2010) Comparison of some genetic structures of wheat for morphological traits, yield and its components. Anbar Journal of Agricultural Sciences.
9. El-Said, M. A. A., & Mahdy, A. Y. (2016). Response of two wheat cultivars to foliar application with amino acids under low levels of nitrogen fertilization. *Middle East Journal of Agriculture Research*, *5*(4), 462-472.
10. Glamočlija, N., Starčević, M., Ćirić, J., Šefer, D., Glišić, M., Baltić, Ž., Marković, R., Spasić, M., Glamočlija, Đ. (2018): The importance of triticale in animal nutrition. – Veterinary Journal of Republic of Srpska (Banja Luka) XVIII(1): 73-94. doi: 10.7251/VETJ1801073G
11. Noaema, A. H., Abdul-alwahid, M. A. A., & Alhasany, A. R. (2020). Effect of planting dates on growth and yield of several european varieties of triticale (*x-ticosecale wittmack*) under environmental conditions of al-muthanna district, IRAQ. *Int. J. Agricult. Stat. Sci. Vol*, *16*(1), 1261-1267.
12. Zaki, N. M., Ahmed, A & Hassanein, M. S. Effect of cultivars, nitrogen fertilizer and bio-fertilizer on yield and yield components on barley.

ISSN 2072-3857