The Effect Of Nitrogen Fertilizer Levels And Cutting On The Growth And Yield Of Two Varieties Of (X Trititcosecale Wittmac(

Elias Kheder Abd Ebrahim Salim A. Y. Al-Ghazal
Department of Field Crops / College of Agriculture and Forestry / University of Mosul
salimalghazal@uomosul.edu.iq

Abstract

A field experiment was conducted during the winter agricultural season of 2022-2023 at two locations: the first in the center of Erbil Governorate, 80 km northeast of Mosul, and the second in the Zumar district / Ain Al-Faras village, 70 km west of Mosul. Both areas are characterized by semi-guaranteed rainfall for studying the effect of three levels of nitrogen fertilizer (0, 40, and 80 kg.ha-1) and two levels of cutting (no cutting and one-time cutting at the beginning of tillering (Z21)) on the yield of two varieties of Triticale (Rizan and Sara). The experiment was conducted using a split split-plot design with three replications. The results can be summarized as follows:

The results showed a significant superiority of the 80 kg.ha-1 nitrogen fertilizer level over the control treatment (no fertilizer) in traits such as spike number per square meter, number of grains per spike, 1000-grain weight, grain yield, and protein percentage in grains. These values reached (303.58 spikes.m-2, 227.25 spikes.m-2), (45.00 grains.spike-1, 51.79 grains.spike-1), (41.29 g, 37.41 g), (747.33 kg.ha-1, 461.25 kg.ha-1), and (10.43%, 9.55%) respectively at the Erbil and Zumar Locations. The results also indicated a significant superiority of the no-cutting treatment over the cutting treatment in traits such as spike number per square meter, number of grains per spike, 1000-grain weight, grain yield, and protein percentage in grains. These values reached (281.39 spikes.m-2, 229.16 spikes.m-2), (40.63 grains.spike-1, 40.86 grains.spike-1), (36.66 g, 37.83 g), (648.61 kg.ha-1, 412.83 kg.ha-1), and (respectively). Furthermore, the results showed that the Rizan variety outperformed the Sara variety in grain yield at both study Locations, with values of (604.06 kg.ha-1, 404.83 kg.ha-1) respectively, while Sara variety had higher means for spike number per square meter with values of (271.06 spikes.m-1, 193.66 spikes.m-1) respectively.

Keywords: : Nitrogen Fertilizer, Varieties, Cutting, Triticale

Introduction

The importance of this rye wheat (triticale) comes from its use as a substitute for yellow corn, partially or completely, sometimes in poultry diets. Due to the high percentage of protein in it (about 15%) compared to yellow corn (5.8%), its use reduces the use of meal. Soybean or protein concentrates. It is also possible to utilize post-harvest residues to graze sheep and goats or use them as hay to store for their own use. When needed or during feed scarcity (Khalil et al., 2015). Efforts are currently focused on enhancing the use of this crop's grains in human food as a competitor to other crop grains. (Beres et al., 2010.(

[1]Adding nitrogen fertilizer in large quantities at the wrong time can negatively affect the environment as well as increase high agricultural costs (Cui et al., 2014: Maharjan et al., 2014). Determining the rate of adding nitrogen fertilizer is considered of great importance in increasing the efficiency of the

ISSN 2072-3857

crop by increasing its quantitative characteristics and improving its qualitative characteristics, especially in areas irrigated by rain (Belete et al., 2018). Bielski et al. (2020) mentioned in their experiment when using levels of nitrogen fertilization (180, 120, 80, 40, 0) kg.h-1 that there were significant differences between the levels of fertilizer, as the fertilization treatment was superior to the level of (160 kg.ha-1). The growth and formation of shoots in rye wheat and most small grain crops is considered one of the main and important characteristics that contribute to determining the grain yield, especially when the apical dominance is broken at the beginning of growth using methods of cutting the growing apex, where removing the apical bud leads to freeing the growth of the lateral shoots and increasing their number, thus increasing the number of shoots. ears, thus increasing the total yield (Evers et al., 2004). Meena et al. (2017) showed in their study to determine the effect of cutting on grain yield in barley, where they noted that the one-time cutting treatment gave the highest grain yield.

The first means of increasing production for any crop is to choose the variety appropriate to the conditions of the region in which it will be grown, as introducing varieties into comparative experiments is considered one of the best ways for the purpose of choosing the best variety in terms of production, and this method expresses one of the best ways to spread the cultivation of varieties, Rasheed (2023) reached. In his experiment with three varieties of rye wheat (Farah, Amal 7, and Al-Muhannad), there were significant differences between the varieties, as the variety Amal 7 excelled and recorded the highest significant value for the traits: number of ears, number of grains per ear, and grain yield. E.: This study aims to compare two newly introduced varieties of rye wheat. To choose the best variety in terms of production. Comparing the plants of the two varieties by cutting and not cutting the growing top and explaining its effect on the quantity of yield to choose the best. Choose the appropriate combination in terms of the best variety and the level of fertilizer that gives the highest production, while cutting or not cutting off the growing top

Material and Methods

The study was conducted during the winter cropping season of 2022-2023 at two locations: the first Location was in Erbil (80 km northeast of Mosul), and the second Location was in Zamar / Ain Al-Faras village (70 km northwest of Mosul). The study included three factors: the first factor comprised three levels of nitrogen fertilizer, namely (0, 40, and 80 kg.ha-1). Urea fertilizer (46%) was used, with half of the quantity applied at sowing and the other half one month after sowing, following the recommendation of the Ministry of Agriculture. The second factor was cutting (without cutting and cutting once at the Z21 stage when the main stem of the plant had one tiller). Two varieties of Triticosecale Wittmack Triticale, Rizan and Sara, were used.

The study was conducted as a factorial experiment using a split-plot design with three replications, following the complete randomized design (R.C.B.D), as described by [4] The main plots were allocated for nitrogen fertilizer levels, while the subplot was assigned for cutting levels and the sub-subplot for varieties. Each experimental unit had an area of 6 square meters with dimensions of 3m × 2m. Within each experimental unit, there

ISSN 2072-3857

were 10 rows spaced 20 cm apart, with each row measuring 3 m in length. The distance between each experimental unit was 0.5 m, and between each replication was 1 m. The treatments were randomly assigned to the experimental units.

Each variety was sown at a rate of 300 seeds.m-2. The sowing was done manually at both study Locations on 20th and 21st November 2022 for Erbil and Zamar, respectively. The fields were irrigated as needed using supplementary irrigation. Harvesting was done manually after the plants matured, on 1st and 5th June 2023 for Erbil and Zamar, respectively. Plant height (cm), number of spikes per square meter, number of grains per spike, 1000-grain weight (g), grain yield (g.m-2), and crude protein content (%) in grains were measured.

The data were analyzed using the split-plot design for factorial experiments, following the complete randomized design (R.C.B.D) with three replications.

Results and Discussion

Effect of Nitrogen Fertilizer Levels: The results in Table (1) show a significant effect of fertilizer on the spike number m2, where the treatment with 80 kg.ha-1 of fertilizer achieved the highest significant value, reaching (303.58 spikes.m-2 and 227.25 spikes.m-2) for both locations, Erbil and Zumar, respectively .

The reason for this may be that adding nitrogen fertilizer leads to an increase in nutrients and their availability in the soil, which facilitates their absorption by the roots and then the transfer of water and nutrients from the soil to the plant, thus causing a prolongation of the vegetative growth period and thus increasing the number of shoots. The result agreed with what was It was found by [5], [6], and [7.[

Furthermore, there is a significant effect of fertilizer treatments on the 1000-grain weight, where the treatment with 80 kg.ha-1 of fertilizer recorded the highest significant value for this trait in both locations, reaching (41.29 g and 37.41 g) for Erbil and Zumar, respectively. This may be due to The data indicate that there is a significant effect between the fertilizer treatments on the character of the weight of 1000 grains and in both sites, where the fertilizer treatment at the level of 80 kg.ha-1 recorded the highest significant value for that characteristic and for both sites Erbil and Zammar, as it reached (41.29 g and 37.41 g) respectively. The reason for this may be due to an increase in some quantitative characteristics, including the number of ears per unit area, as well as the number of grains per ear, which leads to competition for the products of photosynthesis processes within the plant, as when the necessary nutrients are not available, it will lead to the production of small and atrophied grains, which means This means that an increase in one of the components of the yield will lead to a decrease in one of its components. This result is consistent with what everyone found [10] and [11.[

The data in Table (1) also show significant differences between fertilizer treatments in grain yield at the study Locations, where the treatment with 80 kg.ha-1 of fertilizer achieved the highest significant value in both locations, reaching (747.33 kg.ha-1 and 461.25 kg.ha-1) respectively. The superiority in increasing grain yield may be attributed to the importance and role of nitrogen fertilizer in increasing yield and its components, including the number of spikes per square

ISSN 2072-3857

meter and the number of grains per spike. These traits represent the
final outcome of physiological processes within the plant during its life stages, ultimately leading to an increase in grain of protein in grains at both study Locations, where the treatment with 80 kg.ha-1 of fertilizer achieved the highest significant value for this trait, reaching (12.40% and 11.45%) for Erbil and Zumar, respectively. This can be and increase of protein in grains. These results are consistent with those reported by [13.[

Effect of Cutting:

Table (2) reveals significant differences in the cutting treatment in both study locations for the trait of spike number per square meter. The treatment without cutting outperformed in both experimental locations, achieving the highest significant value, reaching (281.39 spikes.m-2 and 229.16 spikes.m-2) respectively. Meanwhile, the cutting treatment recorded the lowest mean in the Zumar Location, with an average of 176.38 spikes.m-2. The treatment without cutting achieved the highest significant value for the number of grains per spike for both locations, reaching (43.91 grains.spike-1 and 49.47 grains.spike-1) respectively. In contrast, the cutting treatment recorded the lowest mean, reaching (40.63 grains.spike-1 and 40.86 grains.spike-1) for both locations Erbil and Zumar respectively. The reason for this might be the insufficient time for the development and growth of spikes naturally due to the lack of sufficient nutrients for grain filling. This leads to the production of some shriveled or dead grains since cutting reduces the number of grains per spike. These results are consistent with those of other researchers.

The data indicate significant differences between cutting treatments in the 1000-grain yield. These findings are consistent with those of [12.[

The data indicate a significant difference between fertilizer treatments in the percentage

attributed to the importance and role of nitrogen, which is considered the essential and primary element in building proteins as it is one of the most important components of amino acids contributing to the building weight in the Zumar Location only. The treatment without cutting achieved the highest significant value for this trait, reaching (37.83 g). This is because cutting operations lead to the depletion of all nutrients and shorten the growth period, thereby reducing the accumulation of chemical elements inside the grain. These findings align with the results of other researchers.

Furthermore, significant differences were observed between cutting treatments in grain yield, where the treatment without cutting achieved the highest significant value, reaching (648.61 kg.ha-1 and 412.83 kg.ha-1) for both locations respectively. This is because cutting operations deplete the nutrients synthesized in the processes of vegetative growth and tiller formation, resulting in a decrease in grain weight per spike and consequently a decrease in grain yield. These findings are consistent with those of other researchers.

Finally, the data in Table (2) indicate no significant differences between cutting treatments in the percentage of protein for both study locations.

The data presented in Table (3) indicate significant differences between the varieties in the trait of spike number per square meter in both Erbil and Zumar locations. The variety "Sara" outperformed in both locations,

ISSN 2072-3857

recording the highest significant value for spike number per square meter, reaching 271.06 spikes.m2 and 193.66 spikes.m2 in Erbil and Zumar respectively. However, there was no significant difference from the variety "Rezan" in both experimental locations. This superiority can be attributed to the genetic variation and the suitability of varieties in producing a greater number of tillers and secreting enzymes or hormones that stimulate tillering, resulting in a higher number of spikes per unit area compared to varieties with limited tillering ability. This finding is consistent with the research conducted by [15] and [16.[

The data also indicate no significant effect between the two varieties in the trait of grains per spike in both locations. Additionally, there was no significant difference between the varieties in the 1000-grain weight in both experimental locations. However, significant differences were observed between the varieties in grain yield in both locations, where the variety "Rezan" outperformed, recording the highest significant value, reaching (604.06 kg.ha-1 and 404.83 kg.ha-1) respectively,

while the variety "Sara" recorded the lowest mean in the Zumar Location, reaching (334.78 kg.ha-1). The reason for this variation is the genetic differences in grain yield, which is greatly influenced by environmental conditions and soil conditions in the experimental area. This finding aligns with the results of [17.[

Furthermore, the results in the table demonstrate no significant difference between the varieties in the percentage of protein in grains in both experimental locations.

The data in Tables 4 and 5 indicate no significant difference for the interaction between treatments of cutting and varieties at the Erbil Location in terms of spike number per square meter, grain number per spike, and protein percentage in grains. However, all other traits were significant. The interaction between the Rezan variety and the no-cutting treatment recorded the highest spike number per square meter, reaching 216.88 spikes/m^2 in the Zumar Location only. Additionally, the interaction between the Rezan variety and the no-cutting treatment recorded the highest grain yield in both Erbil and Zumar Locations, with values of 687.0 and 452.67 kg/ha, respectively.

The data in the two tables indicate a significant interaction between fertilizer levels and varieties in all studied traits at both study Locations, except for the weight of 100 grains at the Zumar Location, which was not significantly affected. The interaction between the Rezan variety and the 80 kg/ha fertilizer level recorded the highest values for spike number per square meter, grain number per spike, grain yield, and protein percentage in grains, reaching 305.17, 245.17, 753.83 kg/ha, and 12.46%, respectively, at the agricultural Locations, respectively. Conversely, the lowest values recorded from the interaction between the Rezan variety and the no fertilization treatment were 5.241, 38.75, 474.33 kg/ha, and 10.27%, respectively, at the Erbil Location only. Similarly, the same traits and sequence recorded the lowest values from the interaction between the Sara variety and

ISSN 2072-3857

the no fertilization treatment at the Zumar Location, reaching 174.17, 83.66, 251.0 kg/ha, and 9.5%, respectively

Table (1): Effect of Nitrogen Fertilizer Levels on Grain Yield Characteristics and Grain Protein Percentage at the Study Location.

Nitrogen Fertilization Levels (kg/ha)	**Number of Spikes per m^2**	**Number of Grains per Spike**	**1000 Grain Weight (g)**	**Grain Yield (kg/ha)**	**Protein Content (%)**
Erbil					
Control (0)	247.50 b	38.96 b	37.49 a	441. 17 b	10.43 b
40	260.92 b	42.85 ab	39.34 b	566.00 ab	10.91 b
80	303.58 a	45.00 a	41.29 a	747.33 a	12.40 a
Zumar					
Control (0)	181.25 b	44.16 a	36.47 b	264.42 c	9.55 c
40	199.83 b	48.50 b	36.64 b	383.75 b	10.30 b
80	227.25 a	51.79 a	37.41 a	461. 25 a	11.45 a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

The interaction between fertilizer levels and cutting treatments was significant for all studied traits at both study Locations, including spike number per square meter, grain number per spike, weight of 1000 grains, grain yield, and protein percentage in grains. The highest values from the interaction between the 80 kg/ha fertilizer level and the no cutting treatment reached 310.33, 253.83, 46.33, 53.0, 41.96, and 38.52, respectively, at both the Erbil and Zumar Locations. Conversely, the lowest values from the interaction between the no fertilization treatment and the cutting treatment for the same aforementioned traits, and in the

ISSN 2072-3857

same sequence, were 237.83, 153.67, 36.46, 42.50, 37.16, and 35.54, respectively, at both Locations.

The data in Tables 10 and 11 indicate significant differences for the interaction between nitrogen fertilizer levels, cutting treatments, and varieties in all studied traits at both study Locations. The interaction between the 80 kg/ha nitrogen fertilizer level, no cutting treatment, and the Sara variety recorded the highest values for grain number per spike and weight of 1000 grains, reaching 46.16 and 41.99, respectively. Conversely, the interaction between the same fertilizer level, no cutting treatment, and the Rezan variety recorded the highest spike number per square meter and grain yield, reaching 323 and 819.0, respectively, only at the Erbil Location. Meanwhile, the interaction between the same fertilizer level, no cutting treatment, and the Rezan variety at the Zumar Location recorded the highest values for spike number per square meter, grain number per spike, weight of 1000 grains, and grain yield, reaching 272.67, 53.66, 38.72, and 532.0, respectively, in the same order. The lowest values for the majority of the studied traits were recorded from the interaction between the no fertilization treatment, cutting treatment, and the Rezan variety at both study Locations

.

Table (2): Effect of Cutting on Grain Yield Characteristics and Grain Protein Percentage at the Study Location.

	Number of Spikes per m^2	**Number of Grains per Spike**	**1000 Grain Weight (g)**	**Grain Yield (kg/ha)**	**Protein Content (%)**
Erbil					
cut	259.94 a	40.63 b	39.06 a	521.06 b	11.16 a
Without	281.39 a	43.91 a	36.66 a	648.61 a	11.33 a
Zumar					
cut	176.38 b	46.86 b	35.85 b	326.78 b	10.35 a
Without	229.16 a	49.47 a	37.83 a	412.83 a	10.52 a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

ISSN 2072-3857

Table (3): Effect of Varieties on Grain Yield Characteristics and Grain Protein Percentage at the Study Location

Varieties	Number of Spikes per m^2	Number of Grains per Spike	1000 Grain Weight (g)	Grain Yield (kg/ha)	Protein Content (%)
Erbil					
Rezan	270.28a	41.38a	40.23a	604.06a	11.22 a
Sarah	271.06a	42.96a	38.52b	565.61a	11.28 a
Zumar					
Rezan	211.88a	48.61a	36.55a	404.38a	10.40 a
Sarah	193.66b	47.72a	37.16a	334.78b	10.40 a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

Table (4): Effect of Interaction between Varieties and Cutting Treatments on Grain Yield Characteristics and Grain Protein Percentage at the Study Location in Erbil

Varieties	Tillage	Number of Spikes per m^2	Number of Grains per Spike	1000 Grain Weight (g)	Grain Yield (kg/ha)	Protein Content (%)
Rezan	Cut	250.22a	39.60 c	40.22a	521.11 b	11.10a
	Without	290.33a	43.57ab	40.24a	687.00 a	11.34a
Sarah	Cut	269.67a	41.66 bc	37.97b	521.00 b	11.23a
	Without	272.44a	44.25 a	39.07ab	610.22 ab	11.33a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

ISSN 2072-3857

Table (5): Effect of Interaction between Varieties and Cutting Treatments on Grain Yield Characteristics and Grain Protein Percentage at the Study Location in Zamar

Varieties	Tillage	Number of Spikes per m^2	Number of Grains per Spike	1000 Grain Weight (g)	Grain Yield (kg/ha)	Protein Content (%)
Rezan	Cut	182.33c	47.66 ab	35.42b	357.00 b	10.32a
	Without	241.44a	49.55a	37.69 a	452.67a	10.47a
Sarah	Cut	170.44c	46.06 b	36.29 b	296.56 b	10.37a
	Without	216.88b	49.38 a	37.97 a	373.00 ab	10.47a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

Table (6): The Effect of Interaction between Fertilizer Levels and Varieties on Grain Yield and Protein Percentage in Grain at Erbil Location.

Variety	Nitrogen Fertilizer Level (kg/ha)	Spike Number (spikes/m^2)	Spikelet Number	1000 Grain Weight (g)	Grain Yield (kg/ha)	Protein Percentage (%)
Rizan	Control (0)	241.50b	38.75 c	38.17 b	474.33 b	10.27c
	40	264.17ab	41.65bc	40.54 a	584.00ab	10.91b
	80	305.17a	44.36 ab	41.97 a	753.83a	12.46
Sarah	Control (0)	253.50ab	39.18cd	36.81 b	408.00 b	10.58b c
	40	257.67ab	44.05ab	38.13 b	548.00 b	10.91b
	80	302.00a	45.65a	40.62 a	740.83 a	12.35a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

ISSN 2072-3857

Table (7): The Effect of Interaction between Fertilizer Levels and Varieties on Grain Yield and Protein Percentage in Grain at Zumar Location.

Variety	Nitrogen Fertilizer Level (kg/ha)	Spike Number (spikes/m^2)	Spikelet Number	1000 Grain Weight (g)	Grain Yield (kg/ha)	Protein Percentage (%)
Rizan	Control (0)	188.33 ab	83.66d	36.02a	277.83 c	9.61c
	40	202.17 b	87.41b	36.35a	425.83 ab	10.23b
	80	245.17a	90.81a	37.30a	510.83 a	11.35a
Sarah	Control (0)	174.17 c	83.66d	36.93a	251.00 c	9.50c
	40	197.50 bc	84.80cd	36.93a	341.67 bc	10.36b
	80	209.33 b	86.56bc	37.53a	411.67 ab	11.55a

Table 8 shows the interaction effect between fertilizer levels and cutting on grain yield and protein percentage in grains at the Erbil location.

Nitrogen Fertilization Levels (kg/ha)	Cutting	Number of Spikes per Square Meter (spikes/m2)	Number of Grains per Spike	Weight of 1000 Grains (g)	Grain Yield (kg/ha)	Protein Percentage in Grains
Control (0)	Cut	237.83c	36.46c	37.16d	385.67 d	10.30d
	Without	257.17bc	41.46b	37.82cd	496.67cd	10.56cd
40	Cut	245.17c	41.75b	39.49bc	493.67cd	10.81bc
	Without	276.67ab	43.95ab	39.19bc	638.33bc	11.01b
80	Cut	296.83ab	43.33a	40.63a	683.83ab	12.43a
	Without	310.33a	46.33a	41.96a	810.83 a	12.43a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

ISSN 2072-3857

Table 9: Interaction effect between fertilizer levels and cutting on grain yield and protein percentage in grains at the Zammar location.

Nitrogen Fertilization Levels (kg/ha)	Cutting	Number of Spikes per Square Meter (spikes/m 2)	Number of Grains per Spike	Weight of 1000 Grains (g)	Grain Yield (kg/ha)	Protein Percentage in Grains
Control (0)	Cut	153.67d	42.50E	35.54 d	235.83d	9.53c
	Without	208.83bc	45.83d	37.71d	293.0d	9.58c
40	Cut	174.83cd	47.50c	35.71d	337,33bc	10.11bc
	Without	224.83ab	49.58b	37.57b	430.17ab	10.48b
80	Cut	200.67bc	50.58a	36.31 b	407.17b	11.40a
	Without	253.83a	53.00a	38.52a	515.33a	11.45a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

ISSN 2072-3857

Table 10 illustrates the interaction effect between fertilizer levels, cutting, and varieties on grain yield and protein percentage in grains at the Erbil location.

Nitrogen Fertilization Levels (kg/ha)	Varieties	Cutting	Number of Spikes per Square Meter (spikes/m2)	Number of Grains per Spike	Weight of 1000 Grains (g)	Grain Yield (kg/ha)	Protein Percentage in Grains
Control (0)	Rizan	Cut	221.67ab	36.16d	38.02de	389.7c	10.20c
		Without	261.33ab	41.33bc	38.33cde	559.abc	10.36bc
	Sara	Cut	254.00ab	36.67d	36.31e	381.7c	10.40bc
		Without	253.00ab	41.61bc	37.31de	434.3bc	10.76bc
40	Rizan	Cut	241.67ab	39.40cd	40.61ab	485.0bc	10.80 bc
		Without	286.67ab	43.90ab	40.48abc	683.0ab	11.03bc
	Sara	Cut	248.67ab	44.10ab	38.36cde	502.3bc	10.83bc
		Without	266.67ab	44.00ab	37.90de	593.7abc	11.00b
80	Rizan	Cut	287.33ab	43.23abc	42.02	688.7ab	12.30a
		Without	323.00ab	45.50ab	41.93	819.0a	12.63a
	Sara	Cut	306.67ab	44.13ab	39.24abc	679.0ab	12.46a
		Without	297.67ab	47.16a	41.99a	802.7a	12.23a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

ISSN 2072-3857

Table 11 shows the effect of the interaction between fertilizer levels, cutting, and varieties on grain yield and protein percentage in grains at the Zumar location.

Nitrogen Fertilization Levels (kg/ha)	Varieties	Cutting	Number of Spikes per Square Meter (spikes/m2)	Number of Grains per Spike	Weight of 1000 Grains (g)	Grain Yield (kg/ha)	Protein Percentage in Grains
Control (0)	Rizan	Cut	161.00e	44.33e	35.02d	261.33d	9.56de
		Without	215.67bc	45.00e	37,02a-d	294.33cd	9.66cde
	Sara	Cut	146.33e	40.66e	36.06bcd	210.33d	9.50e
		Without	202.00bcd	46.66e	37.80abc	291.67cd	9.50e
40	Rizan	Cut	168.33de	47.66cde	35.35cd	370.00bc	10.06bcd
		Without	236.00b	50.00a-d	37.35a-d	481.67ab	10.40b
	Sara	Cut	181.33cde	47.33cde	36.06bcd	304.67cd	10.16bc
		Without	213.67bc	49.16bcd	37.80abc	378.67bc	10.56b
80	Rizan	Cut	217.67bc	51.00abc	35.88bcd	439.67ab	11.33a
		Without	272.67a	53.66a-d	38.72a	532.00a	11.36a
	Sara	Cut	183.67cd	50.33ab	36.75a0d	374.67bc	11.46
		Without	235.00a	52.33ab	38.32ab	448.76abc	11.63a

Means within a column, row and their interactions followed with the same letters are not significantly different from each other according to Duncan multiple ranges test at significant level of 5%.

ISSN 2072-3857

Conclusion

The nitrogen fertilizer level of 80 kg/ha achieved superiority in most of the studied traits, particularly grain yield. The no-cutting treatment outperformed in all growth and yield traits. The Rezan variety achieved the highest grain yield. The combination of the 80 kg/ha nitrogen fertilizer level and no cutting treatment yielded the highest grain yield at the study Locations. The Rezan variety, coupled with no cutting treatment, produced the highest grain yield at the study Locations. The combination of the 80 kg/ha nitrogen fertilizer level, no cutting treatment, and the Rezan variety yielded the highest values for most of the studied

References

[1]Bielski, S., Romaneckas, K., and Šarauskis, E. (2020). Impact of nitrogen and boron fertilization on winter triticale productivity parameters. Agronomy, 10 -2-279.

[2]Meena,N.K.Choudhary,J.and Mali,H.(2017).Effect of dual purpose varieties cutting schedules and fertility levels on nutrient content, uptake, quality and yield of barley (Hordeum vulgare L.) Forage Res,.(42):109-114.

[3]Rachid, Al-Hakam Mamoun. (2023). "Effect of Varieties and Nitrogen Fertilization on Growth, Yield, and Components of Triticosecale Wittmack Triticale." Master's Thesis, College of Agriculture, University of Basrah.

[4]Al-Rawi, Khashaa Mahmoud, and Abdul Aziz Mohammed Khalf Allah. (2000). "Design and Analysis of Agricultural Experiments." Dar Al-Kotob for Printing and Publishing, University of Mosul, p. 488.

[5]Ali, K., Arif, M., Jan, M. T., Yaseen, T., Waqas, M., and Munsif, F. (2015). Biochar: a novel tool to enhance Triticale productivity and soil fertility on sustainable basis under Triticalemaize-Triticale cropping pattern. Pak. J. Bot, (47) (3): 1023-1031.

[6]Hassanein, M. S., Ahmed, A. G., and Zaki, N. M. (2018). Effect of nitrogen fertilizer and bio-fertilizer on yield and yield components of two Triticale cultivars under sandy soil. Middle East J. Appl. Sci, 8 (1): 37-42.

[7]Ziyara, Ahmed Jaafar. (2023). "Response of Growth and Yield of Genetic Structures of Triticale (Triticum Aestivum L.) to Mineral and Nano Nitrogen Fertilization." Doctoral Dissertation, College of Agriculture, University of Basrah.

[8]Bielski, S. (2015). Yields of winter triticale under the influence of nitrogen fertilisation and fungicide application. Polish journal of natural sciences. Pol. J. Nat. Sci, 30 - 337-348 .

[9]Buhedma, A. S. I., Mohamed, F. F., and Saleh, S. H. (2016). Effect of biofertilizer and mineral nitrogen levels on yield and yield components of triticale. J. Agric. Res, 42 (4): 480-493 .

[10]Abdelaal, H.K.,P.D.Bugaev , T.N.Fomina.(2019).Nitrogen fertilization effect on grain yield and quality of spring triticale varieties. Indian J.Agic. Res., 53(5) 2019:578-583.

[11]Lalevic, D., Miladinovic, B., Biberdzic, M., Vukovic, A., and Milenkovic, L. (2022). Differences In Grain Yield And Grain Quality Traits Of Winter Triticale Depending On The Variety, Fertilizer And Weather Conditions. Applied Ecology And Environmental Research, 20 (5): 3779.

[12]Prusinski, J., Borowska, M. A. G. D. A. L. E. N. A., and Majcherczak, E. D. W. A. R. D. (2022). The effect of the soil tillage methods for forecrop and N-mineral fertilization on the yield of winter triticale (x

Triticosecale sp. Wittmack ex A. Camus 1927). Agronomy Science, 77(3):435-339.

[13]Biberdzic, M., Lalević, D., Ilic, Z., Milenković, L., Dukić-Vuković, A., Barac, A. and Miladinović, B. (2021). The influence of the variety and different doses of nitrogen on the grain yield and protein content in triticale grain. Agriculture and Forestry.

[14]Al-Atabi, Baydaa Kareem Jaar. (2011). "Response of Two Barley Varieties to Nitrogen Fertilization and Plant Density on Green Yield and Grain Yield." Master's Thesis, Technical College, Plant Production Technologies, University of Babylon.

[15]Al-Dulaimi, Omar Zuhair Abd Al-Majeed Shakir. (2020). "Effect of Seed Priming with Salicylic Acid and Application of Humic Acid on Growth and Yield Traits of Three Varieties of Triticum Aestivum L." Doctoral Dissertation, College of Agriculture, University of Tikrit.

[16]Al-Obaidi, Basim Mansour Mohammed. (2020). "Effect of Planting Dates on Tillering Nature, Field and Productive Characteristics of Genetic Structures of Triticosecale Wittmack and Estimation of Some Genetic Parameters." Master's Thesis, University of Kirkuk, College of Agriculture.

[17]Bijanzadeh, E., Barati, V., Emam, Y., and Pessarakli, M. (2019). Sowing date effects on dry matter remobilization and yield of triticale (Triticosecale wittmack) under late season drought stress. Journal of Plant Nutrition, 42-7- 681-695

.