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Araştırma Makalesi / Research Article

Effect of Nitrogen Fertilization on Yield and Some Yield Characteristics in Wheat Varieties

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Abstract
This research was carried out in Van Tusba Tevekli District in the 2021 summer production season to determine the effects of four different nitrogenous (N) fertilizer doses (0 kg da^{-1} N (control), 8 kg da^{-1} N, 12 kg da^{-1} N and 16 kg da^{-1} N) on some yield and yield traits in four bread wheat varieties (Kose, Bahare, Cemre and Seri-82). The research was planned according to the randomized blocks in split plots experimental design with three replications. In the study, the effects of four different N fertilizer doses on traits such as number of spikes per square meter (NSS), plant height (PH), number of grains per spike (NGPS), thousand-grain weight (TGW), total yield (TY) and grain yield (GY) in four bread wheat varieties were investigated. The effects of all factors used (except the effect of N averages on NSS) on all traits examined were found to be statistically significant ($P<0.05$). According to the research results, the highest NSS values were obtained from the interactions of N8 x Seri-82 (384.00 number/m^2) and N12 x Kose, which are in the same group, PH data N12 x Bahare (57.33 cm), NGPS values N8 x Cemre (18.33 number spike^{-1}) and N12 x Seri-82 and N16 x Cemre which are in the same group, TGW values N16 x Kose (38.50 g), TY values N16 x Kose (432.50 kg da^{-1}) and GY values N16 x Kose (93.71 kg da^{-1}). In the research, negative significant relationships were determined between NSS and TY (r: -0.518*) and GY (r: -0.526*) and positive very significant relationships (r: 0.774***) between TY and GY. It is thought that the low values obtained in the study were due to the experimental conditions and the effect of the drought that occurred during the season. It is thought that better results can be obtained if irrigation can be applied at a level that will eliminate drought stress in summer wheat cultivation in the Lake Van basin.

Keywords: Van lake basin, summer wheat cultivation, nitrogen fertilization, local varieties

1. Introduction

Wheat is one of the plants cultivated by mankind. Due to its high tolerance to biotic and abiotic stress conditions, it has spread over a very wide geography of the World (Yorulmaz and Akinci, 2022; Kalender and Dogan, 2021). Due to the ease of cultivation and industrial processing, it has a share of 20 % in the world and 53 % in Turkiye among plant-based foods (Anonymous, 2017; Cig et al., 2021). Turkey is in a very special position in the world in terms of plant genetic resources due to its rich biodiversity, and wheat is at the forefront of these resources.

Wheat is planted in 219.2 million hectares of area harvested in the world, 368.89 kg da^{-1} yields and 808.4 billion tons produce (FAO, 2022), and in Turkey, it is planted in 68.3 million hectares and produces 22 million tons (TUIK, 2023).

Wheat cultivation in the Lake Van basin has a very long history. Local varieties cultivated in the basin for many years have adapted to all kinds of ecological, climatological and stress conditions (Altuner et al., 2020). Bahare and Kose local wheat varieties have been cultivated by producers for many years as summer crops in the region due to their different characteristics. Wheat is generally produced as winter crops in our region, while summer crops are produced in limited quantities and generally using local crops. In areas with suitable conditions, grains with higher protein and gluten content are obtained from summer bread wheat cultivation compared to winter crops (Kara and Tulubas, 2019). Wheat grain yield is directly related to the availability of usable nitrogen (Bruckner and Morey, 1988; Fiez et al., 1994) and profitability and sales in wheat production depend on nitrogen management (Sylvester-Bradley, 2009). Since the nitrogen requirement of the plant is not fully met, low yields are obtained, excessive fertilization pollutes the environment, and there are economic losses due to fertilizer costs.

Determining the effective nitrogen fertilization amounts in increasing the yield and yield characteristics of Kose and Bahare summer bread wheat varieties, which have been preferred and intensively cultivated by farmers in the Lake Van basin for many years, will contribute to the improvement of the yield and quality obtained from these varieties. For the comparison of the application, registered varieties such as Seri-82 and Cemre, which are preferred for summer cultivation in our country, were used.

2. Materials and Methods

2.1. Climate and soil characteristics of the research area

Some physical and chemical properties of the research area soils are shown in Table 1. According to the analysis results of the samples taken from 0-20 and 20-40 cm depths, the experimental area soils have a loamy texture, a pH concentration close to neutral, a small amount of lime, and insufficient organic matter.

Table 1. Some physical and chemical properties of the research area soils*

Depth (cm)	Texture	pH	Lime (%)	Electrical Conductivity/Salt (dS m^{-1})	Organic Matter (%)
0 - 20	Loamy	7.90	1.29	0.16	0.44
20 - 40	Loamy	7.96	1.25	0.17	0.42

*Van YYU Faculty of Agriculture Plant Nutrition and Soil Department Laboratory analysis results

The 2020-2021 growing season and long-term average precipitation (LTA), temperature and relative humidity values of the Van Tusba Tevekli Neighborhood, where the research was conducted, are shown in Table 2. According to these, a total of 230.3 mm of precipitation was received in the 2020 season. The total LTA precipitation was 374.2 mm, which is approximately 144 mm more than the intra-season precipitation. This situation shows that the season was quite dry. The intra-season temperature average was 9.7 °C, the LTA temperature average was 8 °C, and the intra-season temperature was 1.7 °C higher. It is seen that there is no significant difference between the relative humidity values.

Table. 2. Precipitation, temperature and relative humidity values of the experimental area*

Months	Precipitation (mm)		Temperature (°C)		Relative humidity (%)	
	2020-21	LTA**	2020-21	LTA	2020-21	LTA
September	0.8	20.4	18.8	17.8	42.7	43.9
October	24.1	38.2	13.4	11.2	32.9	57.3
November	22.9	48.8	5.2	4.8	48.2	64.2
December	46.7	45.1	3	0.2	51.3	67.5
January	31.1	45.6	-1.7	-3.1	59.5	66.7
February	21.3	43.4	-1.5	-2.5	63.8	67.2
March	24.4	36.4	2.7	1.5	63.4	65.4
April	36.2	35.6	7	7.6	56.1	59.3
May	15.3	35.9	15.2	13.1	51.9	55.1
June	7.2	18.6	21	18.5	45.4	47.1
Temmuz	0.4	6.2	23.2	22.2	39	42.3
July	230.3	374.2	-	-	-	
Average			9.7	8	50.3	52.6

*Van Meteorology Regional Directorate records **LTA: Long-Term Average

2.2. Plant material

Four types of wheat seeds were used in the study. Bahare (Bitlis rural area) and Kose (Mus rural area) are local varieties and Cemre (Eastern Anatolia Agricultural Research Institute) and Seri-82 (GAP International Agricultural Research Institute) are commercial varieties. The varieties used have the nature of summer bread wheat.

2.3. Establishment, conduction of the research and observations

The research was established in the rural area of the Tevekli Neighborhood of Van Tusba District in the 2021 summer growing season. The plots were planned according to the randomized block design with nitrogenous fertilizer doses (N) in the main plots and varieties in the sub-plots with three replications. The plots were sized as 5 m long and 1.2 m wide, each plot having a size of 6 m², and the trial was placed in 48 plots. The planting norm was set to 450 grains/m², 6 rows, and 20 cm between rows (Akdogan and Soylu, 2018).

Fertilizer doses were divided into four groups 0 kg da^{-1} N (control), 8 kg da^{-1} N, 12 kg da^{-1} N, and 16 kg da^{-1} N. Phosphorus (P_2O_5) in the form of triple super phosphate (TSP) was given to all plots at 7 kg da^{-1} along with planting. Except for the control plots, 4 kg da^{-1} of N fertilizer doses were given to other plots in the form of ammonium sulfate (NH_4SO_4) containing 21% N along with sowing. The remaining N fertilizers were given equally in the form of 46% Urea ($CO(NH_2)_2$) during tillering and stemming periods (Gucdemir, 2006). During the pre-tillering, pre-stemming and pre-heading periods (Akdogan and Soylu, 2018), limited amounts of sprinkler irrigation were applied due to water resource limitations.

After the observations were taken, statistical analyses of the data were performed using the CoSTAT (ver. 6.303) computer package statistical program, and the LSD (0.05) test was used for multiple comparisons for the significance difference between the means. Correlations were made according to the Pearson Correlation method.

3. Results and Discussion

In the study, the effects of four different nitrogenous fertilizer doses on the traits such as number of spike per square meter

(NSS), plant height (PH), number of grain per spike (NGPS), thousand-grain weight (NGW), total yield (TY) and grain yield (GY) in four bread wheat varieties were investigated. The effects of the factors used on the obtained traits are shown in Table 3.

Table 3. Table of interactions, varieties and nitrogen doses of the examined traits*

N**	Varieties	NSS (number/m²)		PH (cm)		NGPS number spike^{-1}		TGW (g)		TY (kg da^{-1})		GY (kg da^{-1})	
N0	KOSE	361.33	ab	37.6	def	10.67	c	33.33	cde	223.13	ef	56.25	gh
	BAHARE	336	ab	54.47	abc	14.67	abc	30	ef	181.25	g	58.96	fg
	CEMRE	358.67	ab	36.07	ef	15	abc	33.33	cde	200.94	fg	64.79	efg
	SERİ-82	374	ab	29.07	f	16.33	abc	31.33	def	173.75	g	42.5	h
N1	KOSE	384	ab	50.47	bc	13.33	bc	35.67	bc	224.79	ef	71.04	def
	BAHARE	365.33	ab	56.17	ab	15.67	abc	38.33	ab	252.92	de	67.08	efg
	CEMRE	345.33	ab	45.83	cd	18.33	a	33	cde	238.13	e	61.25	fg
	SERİ-82	384	a	38.07	de	15.67	abc	30.67	ef	252.5	de	57.29	g
N2	KOSE	344	a	50.63	bc	15.33	abc	34.33	cd	275.21	cd	68.67	efg
	BAHARE	332.67	b	57.33	a	13.67	bc	31.33	ef	318.44	b	65.83	efg
	CEMRE	355.33	ab	46.33	c	14	bc	33.33	cde	329.58	b	76.46	de
	SERİ-82	359.67	ab	37.1	ef	18	a	32.33	de	273.75	cd	78.96	cd
N3	KOSE	334	b	51.8	bc	14.33	bc	38.5	a	432.5	a	93.71	a
	BAHARE	334	b	51.33	bc	14.67	abc	30	f	276.98	c	90.21	ab
	CEMRE	334	b	46.03	c	18	a	33.33	cde	331.77	b	75.21	de
	SERİ-82	333.33	b	39.83	de	16.67	ab	28.33	f	315.63	b	85	bc
	LSD(0.05)	66.47		10.23		6.44		4.06		36.84		15.39	
	C.V. %	0.06		7.7		14.44		4.22		4.7		7.58	
VAR. AVERAGE	KOSE	355.83	**AB**	47.63	**B**	13.42	**C**	35.46	**A**	288.91	**A**	72.42	**A**
	BAHARE	342	**B**	54.83	**A**	14.67	**BC**	32.42	**B**	257.4	**C**	70.52	**A**
	CEMRE	348.33	**AB**	43.57	**C**	16.33	**AB**	33.25	**B**	275.1	**B**	69.43	**AB**
	SERİ-82	362.75	**A**	36.02	**D**	16.67	**A**	30.67	**C**	253.91	**C**	65.94	**B**
N AVERAGE.	N0	357.5	**A**	39.3	**B**	14.17	**B**	32	**B**	194.77	**D**	55.63	**D**
	N1	369.67	**A**	47.63	**A**	15.75	**AB**	34.42	**A**	242.08	**C**	64.17	**C**
	N2	347.92	**A**	47.85	**A**	15.25	**AB**	32.83	**B**	299.24	**B**	72.48	**B**
	N3	333.83	**A**	47.25	**A**	15.92	**A**	32.54	**B**	339.22	**A**	86.03	**A**

*There is no statistically significant difference of 0.05% between data shown with the same uppercase and lowercase letters in the same column.
**N0: 0 kg da^{-1} N (Control), N1: 8 kg da^{-1} N, N2: 12 kg da^{-1} N, N3: 16kg da^{-1} N.
NSS: number of spikes per square meter, PH: plant height, NGPS: number of grains per spike, TGW: thousand-grain weight, TY: total yield, GY: grain yield

3.1. Number of spikes per square meter (plant m^{-2})

The interactions, varieties, and nitrogen doses obtained in the study are shown in Table 1. The effect of interactions and varieties on the obtained NSS values has been statistically significant (P<0.05). The effects of N doses on NSS have been statistically insignificant (P>0.05). NSS values ranged from NSS 333.83-369.67 plant m^{-2} based on N doses. NSS numbers varied between 342.00-362.75 plant m^{-2} according to the varieties. The highest NSS data was observed in Seri-82, and the lowest in Bahare variety. According to the interactions, NSS values ranged from

332.67-384.00 plant m^{-2}. Thus, the highest NSS values were obtained from the interactions of N1 x Seri-82 and N2 x Kose, which are in the same group, and the lowest NSS values were obtained from the interaction of N2 x Bahare, which is in the same group as the N3 dose with other variety interactions.

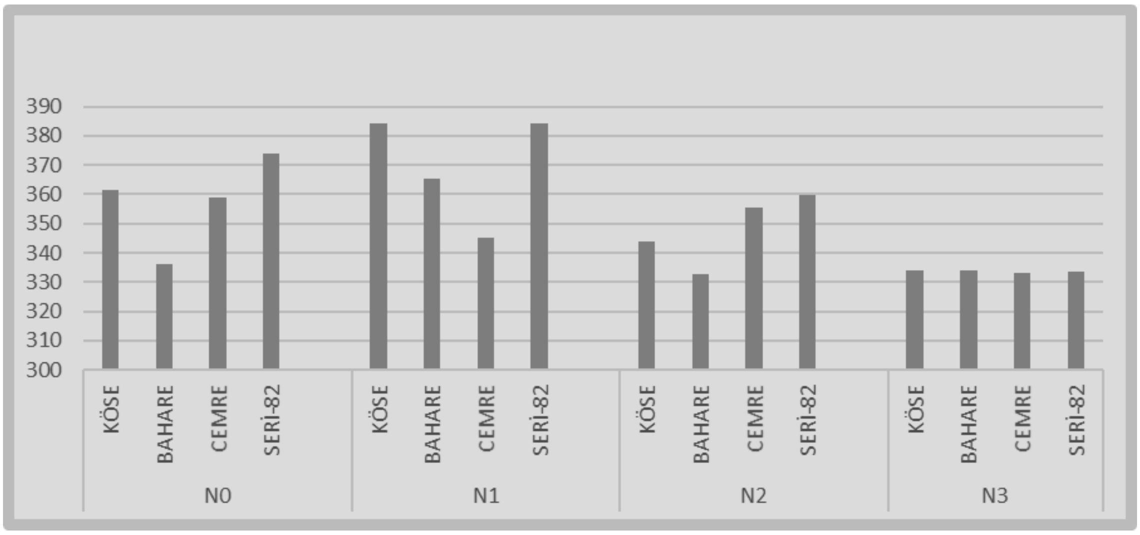

Figure 1. NSS graph obtained according to fertilizer doses and variety interactions

According to the NSS graph of fertilizer doses and variety interactions (Figure 1), NSS values of all varieties in the N3 dose fell below the control dose (N0) without fertilizer. High values were obtained from N1 and N0 fertilizer doses. Based on four fertilizer doses (0, 7, 14, and 21 kg da^{-1} N), the number of spikes per square meter varied between 405-665 (Aksu, 2017). Our findings are lower than these results. The number of spikes per square meter varied between 255.4-328.9 in a study conducted in Sivas conditions (Yilmaz and Simsek, 2012) and 336.7-352.6 in a study conducted in Bursa conditions (Senyigit, 2013). The findings obtained in our study are similar to these results.

3.2. Plant height (cm)

Interactions, N doses, and PH values of the varieties are given in Table 3. The effects of all factors on PH were found to be statistically significant ($P<0.05$). PH values ranged between 39.30-47.85 cm according to N doses. PH values were taken from the lowest N0 and highest N2 dose averages and the remaining doses. PH values ranged between 43.57-54.83 cm according to varieties. The highest PH values were taken from Bahare and the lowest from Cemre. PH values ranged between 29.07-57.33 cm according to interactions. The highest PH values were obtained from N2 x Bahare and the lowest N0 x Seri-82 interactions.

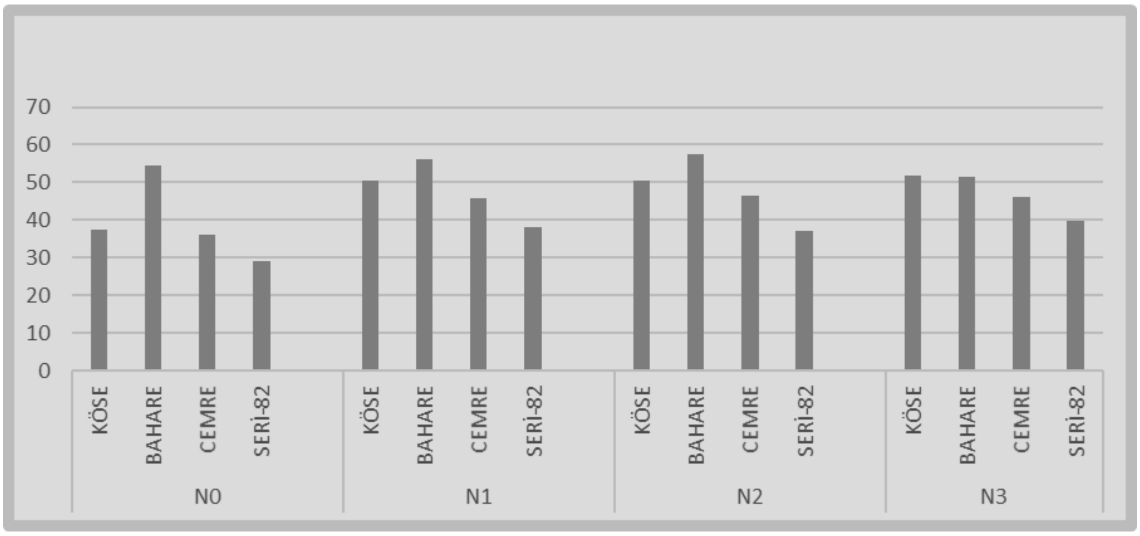

Figure 2. PH graph of fertilizer doses and variety interactions

According to the interaction graph of N doses and varieties (Figure 2), it is observed that N1, N2 and N3 doses have similar effects on PH in varieties, and high values are formed in the N0 x Bahare interaction with these doses. Low doses were obtained from the interactions of N0 doses with other varieties. In a study conducted by Akdogan and Soylu, (2017), plant heights were obtained between 79.50-115.00 cm. In a study conducted with four fertilizer doses (Aksu, 2017), plant heights were formed between 63.2-110.1 cm. Our research findings are lower than these results. In another study conducted in Bursa conditions in the 2011-2012 agricultural season, plant heights varied between 44.2-55.7 cm (Senyigit, 2013). Our findings are similar to the results of this study. Agricultural droughts experienced during critical development periods negatively affect plant height (Subhani and Ghowdhvy 2000; Kimurto et al. 2004; Shamsi et al. 2010). The decrease in rainfall in the 2020-2021 research season negatively affected the plant heights in our study.

3.3. Number of grains per spike (number spike^{-1})

In the study, interactions, N doses and NGPS values of varieties are shown in Table 3. Accordingly, the effects of all factors on NGPS were found to be statistically significant ($P<0.05$). NGPS values of N doses varied between 14.17-15.92 number spike^{-1}. NGPS values were obtained from the highest N3 and lowest N0 dose averages. NGPS values of varieties varied between 13.42-16.67 number spike^{-1}. NGPS values were obtained from the highest Seri-82 and lowest Kose variety averages. NGPS values according to interactions varied between 10.67-18.33 number spike^{-1}. The highest NGPS values were obtained from N1 x Cemre and N2 x Seri-82 and N3 x Cemre in the same group, and the lowest were obtained from N0 x Kose interactions.

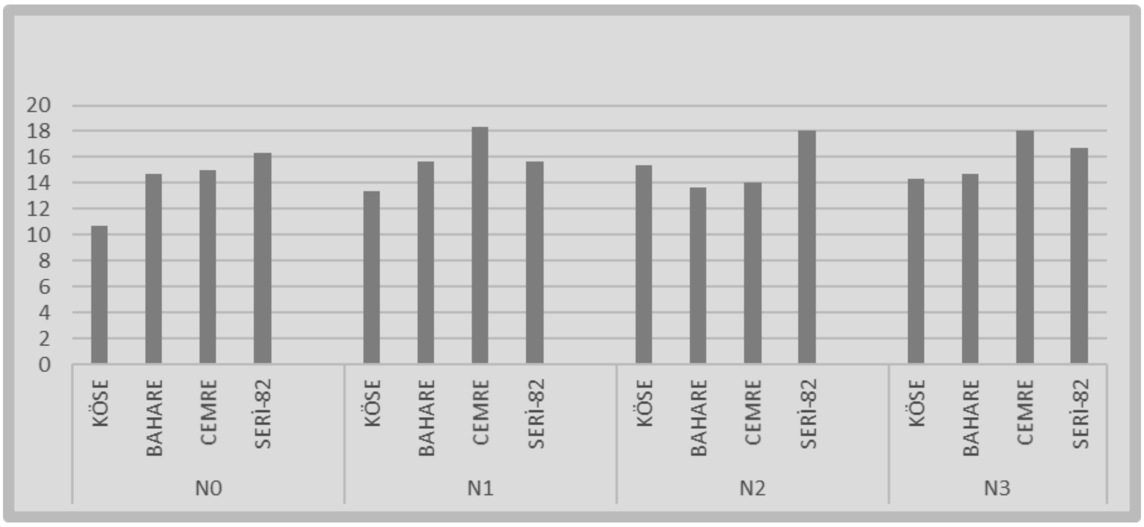

Figure 3. NGPS graph of N doses and variety interactions

The graph regarding the fertilizer doses and NGPS of the varieties examined in the study is given in Figure 3. According to the graph, it is seen that with the application of 8 kg da^{-1} N (N1) fertilizer, NGPS of Kose and Cemre varieties increased, while Bahare and Seri-82 varieties were not affected by this fertilizer dose. It is observed that NGPS of Kose variety increased with the 12 kg da^{-1} N (N2) fertilizer dose and that it also increased in Seir-82 variety at this dose, but Bahare and Cemre decreased. It is understood that 16 kg da^{-1} N (N3) fertilizer dose affected Cemre variety the most. In a study conducted by Akdogan and Soylu, (2017) in dry conditions, NGPS was determined between 31.20-44.90 units. In a study conducted with four fertilizer doses (0, 7, 14, 21 kg da^{-1} N), NGPS was found to be between 39.30-50.00 units (Aksu, 2017). In a study conducted by Kaydan and Yagmur (2008) in Van ecological conditions for two years, NGPS of 16 bread wheat varieties was determined to be between 20.32-27.47 units. Our findings are lower than these results due to the differences in the trial conditions and the drought experienced during the season.

3.4. Thousand-grain weight (g)

Interactions, N doses and TGW values of varieties are shown in Table 3. The effects of all factors on TGW were found to be statistically significant ($P<0.05$). TGW values vary between 32.00-34.42 g according to N doses. TGW values were determined in other doses in the same group with the highest N1 and lowest N0. TGW values vary between 30.67-35.46 g according to varieties. TGW values were taken from the highest Kose and lowest Seri-82 variety averages. TGW values vary between 28.33-38.50 g according to interactions. TGW values were taken from the highest N3 x Kose and lowest N3 x Seri-82 interactions in the same group with N3 x Bahare.

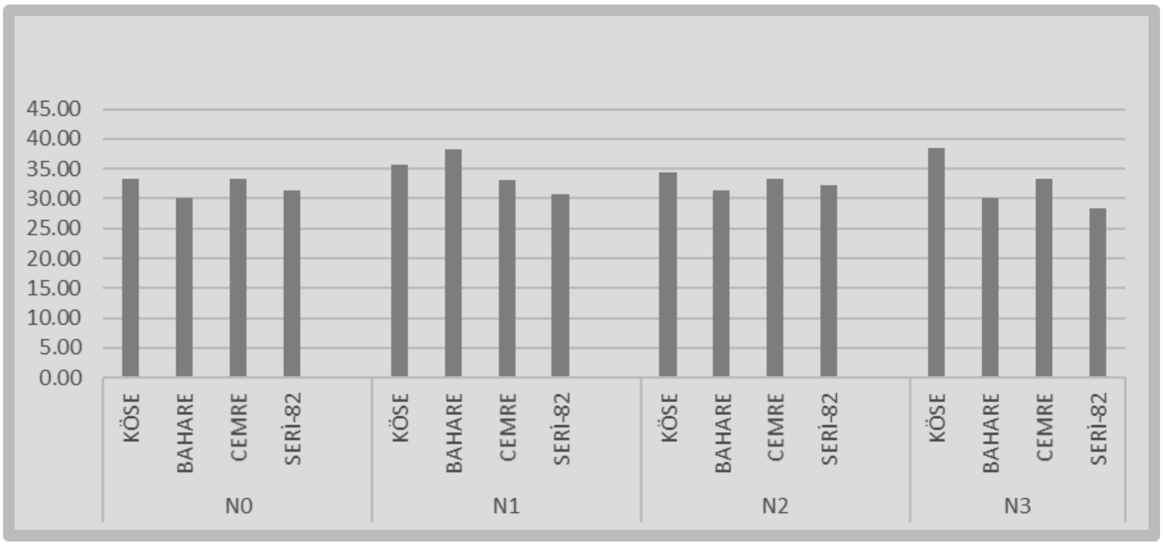

Figure 4. TGW graph of N doses and variety interactions

The TGW graph of the fertilizer doses and varieties examined in the study is given in Figure 4. According to the graph, it is seen that the TGW of the Bahare variety increased with the application of 8 kg da^{-1} N (N1) fertilizer, but it decreased with the following dose. It is understood that the TGW value of the Kose variety at the dose of 16 kg da^{-1} increased compared to the control (N0) and previous doses. In a study conducted on three bread wheat varieties in Central Anatolian conditions, it was determined that the thousand-grain weights varied between 34-40, 30-36 and 31-34 g according to the varieties (Aydemir et al., 2001). In another study conducted in dry conditions, it was determined that the thousand-grain weights of four bread wheat varieties varied between 28.36-36.96 g (Akdogan et al., 2007). In a study conducted by Kaydan and Yagmur (2008) in Van conditions for two years, thousand-grain weights of 16 bread wheat varieties varied between 29.26-37.45 g. Our findings are similar to these results.

3.5. Total yield (kg da^{-1})

In the study, interactions, N doses and TY values of varieties are shown in Table 3. Accordingly, the effects of all factors on TY were found to be statistically significant ($P<0.05$). TY values of N doses varied between 194.77-339.22 kg da^{-1}. TY values were obtained from the highest N3 and lowest N0 dose averages. TY values of varieties varied between 253.91-288.91 kg da^{-1}. The highest TY values were obtained from the Bahare variety averages in the same group as Kose and the lowest Series-82. According to the interactions, TY values varied between 173.75-432.50 kg da^{-1}. The highest TY values were obtained from the N3 x Kose and the lowest from the N0 x Bahare interaction in the same group as N0 x Series-82.

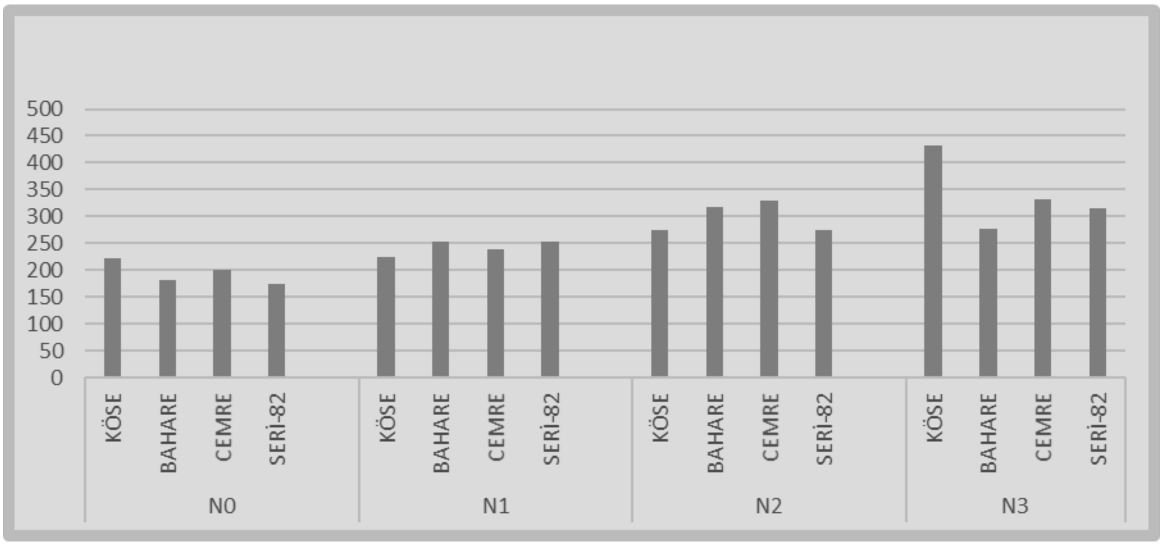

Figure 5. TY graph of N doses and variety interactions

The fertilizer doses and TY of the varieties examined in the study are given in Figure 5. According to the graph, it is seen that increasing fertilizer doses provides an increase in the Total Yields of all varieties. It is seen that the highest Total Yield increase occurred in the Kose variety with a dose of 16 kg da^{-1}. In a study conducted by Gokmen Yılmaz, (2015), TY values of the varieties were determined between 593-1110 kg da^{-1} according to two-year averages. In a study conducted by Akdogan and Soylu, (2017), TY values were determined between 339.4-674.9 kg da^{-1}. It has been revealed by various studies (Serrano et al., 2000; Oweis et al., 2000) that increasing nitrogen doses increase TY. The results of our study are lower than the data obtained in these studies. The effects of regular and sufficient rainfall during the season and appropriate amount of fertilization are great in increasing yield values. The agricultural drought that occurred during the season in which our research was conducted and the fact that the soils of the research area were very poor in terms of organic matter were very effective in decreasing our yield values. The irrigations were not enough to eliminate the stress that occurred.

3.6. Grain yield (kg da^{-1})

GY values of interactions, N doses, and varieties are shown in Table 3. The effects of all factors on GL were found to be statistically significant ($P<0.05$). According to N doses, GY values ranged between 55.63-86.03 kg da^{-1}. GY values were determined in the highest N3 and lowest N0 dose averages. According to varieties, GY values ranged between 65.94-70.52 kg da^{-1}. The highest GL values were taken from Bahare, which is in the same group with Kose, and the lowest from Seri-82 variety averages. According to interactions, GY values ranged between 42.50-93.71 kg da^{-1}. The highest GY values were taken from N3 x Kose and the lowest from N0 x Seri-82 interactions.

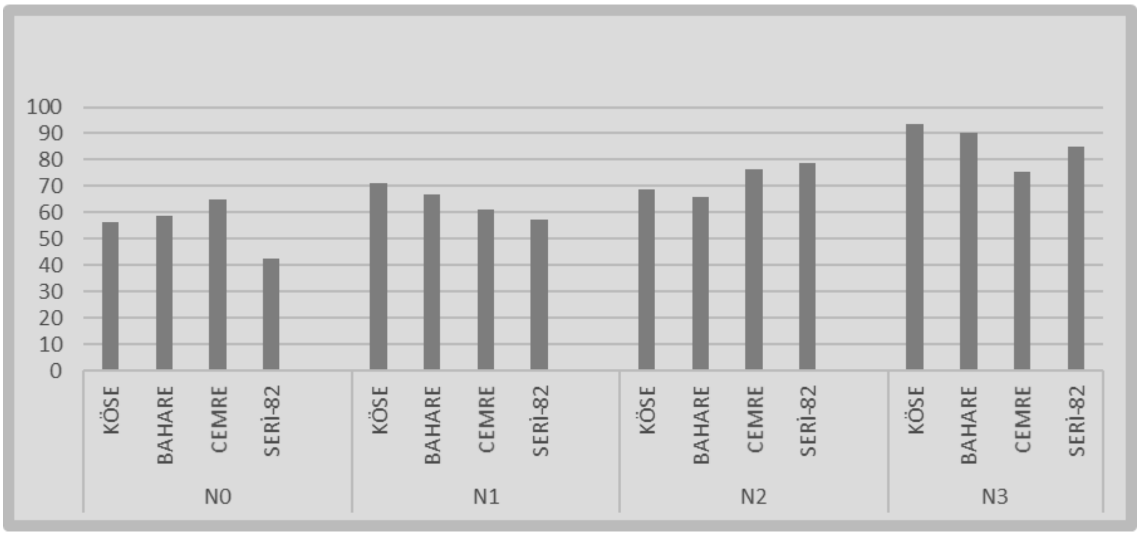

Figure 6. GY graph of N doses and variety interactions

The graph regarding the fertilizer doses and GH data of the varieties examined in the study is given in Figure 6. According to the graph, it is seen that there is a significant increase in TY of the varieties with fertilizer applications (except for Seri-82 in the first dose). It is seen that the highest TY is in Seri-82 with 16 kg da⁻¹ N (N3) dose compared to the control. It is understood that there is a gradual increase compared to the previous dose in the 16 kg da⁻¹ N (N3) application of Kose and Bahare varieties. Grain yields of 14 bread wheat varieties grown in dry conditions in the 2014-2015 growing season varied between 447.42-709.08 kg da⁻¹. Such high grain yields were attributed to more rainfall than the long-term average during the growing season. (Akdogan and Soylu, 2017). As a result of growing 18 bread wheat varieties in dry conditions, grain yields ranged between 331.85-749.07 kg da⁻¹ (Akdogan et al., 2010). In a study conducted using four nitrogen fertilizer doses in the 2014 production season, grain yields were determined between 196.7-819.7 kg da⁻¹ (Aksu, 2017). When NSS increases with N fertilization, NGPS and single-spike yield decrease, but GY increases accordingly (Acer, 2004). Our findings are lower than these data due to insufficient rainfall and experimental conditions.

3.7. Correlation

The correlation graph of the features examined in the study determined by the Pearson Correlation method is shown in Table 4. Accordingly, it is seen that there is a negatively significant (r>0.05) relationship between NSS and TY and GY, and a positively very significant (r<0.01) relationship between TY and GY.

Table 4. Correlation graph of the features examined

	PH	NGPS	TGW	TY	GY
NSS	-0.455	-0.142	0.198	-0.518 *	-0.526 *
PH		-0.202	0.338	0.359	0.379
NGPS			-0.168	0.048	0.077
TGW				0.299	0.162
TY					0.774 ***

NSS: number of spikes per square meter, PH: plant height, NGPS: number of grains per spike, TGW: thousand-grain weight, TY: total yield, GY: grain yield

It was determined that there is a positive and very significant (r: 0.67**) relationship between NSS and GY (Aktas et al., 2017). In another study conducted in Mus conditions, it was observed that there is a positive and very significant (r: 0.9185**) correlation between NSS and GY (Karaman, 2022). It is reported that as the number of ears per unit area increases, grain yield increases, and the number of ears per square meter should be used as a selection criterion in the development of wheat varieties with high grain yield (Kaydan et al. 2008). Similarly, there are other studies suggesting a relationship between the correlation coefficient and breeding studies (Sozen et al., 2005; Karakoy et al., 2014; Kumar et al., 2014; Tonk et al., 2017; Eren and Demire, 2020). It is thought that the low results obtained in our study are due to the trial conditions and the effect of the dry season.

4. Conclusion

In the study, it was determined that the application of 16 kg da^{-1} nitrogen fertilizer was effective in obtaining the highest values in all characteristics. It was found that the Kose local variety exhibited higher performance in terms of thousand-grain weight, total yield, and grain yield characteristics. Accordingly, superior performance was obtained in the interactions of 16 kg da^{-1} nitrogen fertilization doses and the Kose variety for characteristics such as thousand-grain weight, total yield, and grain yield. The low values were obtained due to the experimental conditions and drought during the season. It is considered that similar research, especially with the Kose variety and, if necessary, under irrigated conditions, will be beneficial for obtaining more distinct results in the cultivation of summer wheat in the Van Lake Basin.

Declaration of Author Contributions

The authors declare that they have contributed equally to the article. All authors declare that they have seen/read and approved the final version of the article ready for publication.

Declaration of Conflicts of Interest

All authors declare that there is no conflict of interest related to this article.

Acknowledgment

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References

Akdogan, S., Akcacık, A.G., Sahin, M., Yuksel, K., 2007. Relationships between yield and some quality traits in bread wheat (*T. aestivum* L.) genotypes. *Journal of Field Crops Central Research Institute*, 16:(1-2):21-30.

Akdogan, S., Soylu, S., 2018. Determination of yield, yield components and some quality characteristics of bread wheat varieties in ırrigated growing conditions. *Bahri Dagdas Journal of Plant Research*, 7(1): 23-31.

Aksu, T., 2017. Effect of different nitrogen and farm fertilizer doses on yield, quality and antioxidant activity in bread wheat (*Triticum aestivum* L.). M.S. Thesis, Adnan Menderes University, Institute of Science, Department of Field Crops, p: 84, Aydın.

Aktas, H., Karaman, M., Oral, E., Kendal, E., Tekdal, S., 2017. Evaluation of yield and quality parameters of some bread wheat genotypes (*Triticum aestivum* L.) under natural rainfall conditions. *Journal of Field Crops Central Research Institute*, 26(1): 86-95.

Altuner, F., Oral, E., Baran, İ., 2020. Determination of germination characteristics and relationships between characters of some wheat varieties with local tir populations in Van Lake basin. *Journal of the Institute of Science and Technology*, 11(1): 753-762.

Anonim, 2017. Wheat farming. [Arastirma.tarim.gov.tr/ktae/Belgeler/brosurler/Bugda y%20Tarımı.pdf] (Accessed: 30.03. 2017).

Aydemir, T., Barut, A., Yılmaz, K., Sezer, N., 2001. Evaluation of bread wheat in terms of yield and quality on a regional basis in the national variety list. *IV. Turkish Field Crops Congress*, 17-21.

Brucker, P.L. Morey, D.D., 1988. Nitrogen effects on soft red winter wheat yield, agronomic characteristics, and quality. *Crop Sciences*, 28: 152-157.

Cig, F., Erman, M., Sonmez, F., Ucar, O., Ozcınar, A.B., Soysal, S. 2021. Determination of bread wheat (*Triticum aestivum* L.) varieties suitable for ecological conditions of Siirt province. *MAS Journal of Applied Sciences,* 6(3): 508-517.

Eren, B., Demirel, F., 2020. Correlation analysis of seedling development parameters in some wheat genotypes. Journal of Agriculture, 3(1): 28-32.

FAO, 2022. Wheat statistics in the World. Food and Agriculture Organization of the United Nations. https://www.fao .org/faostat/en/#data/QCL (Accessed: 30.04.2024).

Fiez, T.E., Miller, B.C., Pan, W.L., 1994. Assessment of spatially variable nitrogen fertilizer management in winter wheat. Journal of Production Agriculture, 7: 86-93.

Gucdemir, İ.H., 2006. Turkey fertilizer and fertilization guide. Ministry of Agriculture and Rural Affairs, General Directorate of Agricultural Research, Soil and Fertilizer Research Institute, Ankara.

Kalender, N., Doğan, Y., 2021. Determination of the effect of worm compost on yield and yield-related characteristics in durum wheat (*Triticum durum* L.) varieties. *MAS Journal of Applied Sciences*, 6(Special Issue): 1149-1159.

Kara, B., Tulubas, N., 2019. Comparison of grain yield and some quality characteristics of autumn (On-Time and Late Planting) and summer planted wheat in arid conditions. *Turkish Journal of Nature and Science,* 8(1): 8-12.

Karakoy, T., Baloch, F.S., Toklu, F., Ozkan, H., 2014. Variation for selected morphological and qualityrelated traits among 178 faba bean landraces collected from Turkey. *Plant Genetic Resources,* 12(1): 5-13.

Karaman, M., 2022. Interpretation of genotype, yield, and yield components in bread wheat (*Triticum aestivum* L.) using GGE biplot technique and scatter plot matrix. *Mus Alparslan University Journal of Science,* 10(1): 931-937.

Kaydan, D.,Yagmur, M., 2008. A study on yield and yield components of some bread wheat (*Triticum aestivum* L.) varieties in Van ecological conditions. *Journal of Agricultural Sciences* 14(4): 350-358.

Kimurto, P., Kinyua, M., Njoroge, J., 2004. Response of bread wheat genotypes to drought simulation under a mobile rain shelter in Kenya. *African Crop Science Journal*, 11(3): 225-234.

Kumar, R., Bhushan, B., Pal, R., Gaurav, S.S., 2014. Correlation and path coefficient analysis for quantitative traits in wheat (*Triticum aestivum* L.) under normal condition, *Annals of Agri-Bio Research*, 19(3): 447-450.

Shamsi K., Petrosyan, M., Noor Mohammadi, G., Haghparast, R. J., 2010. Evaluation of grain yield and its components in three bread wheat cultivars under drought stres. Animal and Plant Sciences, 1117-1121.

Sozen, E., Yagdı, K.A., 2005. Research to determine agronomic traits of some advanced durum wheat lines. Adnan Menderes University Journal of Agriculture Faculty, 2(2): 51-57.

Subhani, G.M., Chowdhry, A.A., 2000. Correlation and path coefficient analysis an bread wheat under drought stres and normal conditions. *Pakistan Journal of Biological Sciences,* 3: 72-77.

Sylvester-Bradley, R., 2009. Nitrogen for winter wheat-management guidelines. HGCA Guide 48(G48).

Senyigit, E., 2013. Effects of different nitrogen doses on grain yield and yield components in some bread wheat (*Triticum aestivum* L.) cultivars. Master Thesis, Uludag University, Institute of Science, 55 pages, Bursa.

Tonk, F.A., Istipliler, D., Tosun, M. 2017. Relationships among traits and path analysis in some bread wheat (*Triticum aestivum* L.) genotypes. *Ege University Journal of Agriculture*, 54(1) 85-89.

Tuık, 2023. Turkiye wheat statistics. Turkiye Statistical Institute. https://data.tuik.gov.tr/Kategori/GetKategori?p=tarim-111&dil=1 (Accessed: 30.04.2024).

Yilmaz, N., Simsek, S., 2012. Determination of nitrogenous fertilizer form and amount to be used in top dressing of bread wheat (*Triticum aestivum* L.) in Sivas ecological conditions. *Academic Journal of Agriculture*, 1(2): 91-96.

Yorulmaz, L., Akinci, C., 2022. Investigation of some bread wheat (*Triticum aestivum* L.) genotypes in terms of morphology, physiology, yield and quality in ridge cropping system. *MAS Journal of Applied Sciences*, 7(2): 326-336.

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