UDC: 633.11-152.61:631.559(497.75)"2024"
Professional paper

THE EFFECT OF WHEAT CULTIVAR VARIABILITY (*Triticum aestivum L.*) ON YIELD IN THE POLLOG REGION DURING THE YEAR 2024

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Abstract

The study included four wheat cultivars: Moisson, Apache, Amazon, and Orovçanka. The experiment was conducted in the 2024 vegetative year, following a randomized block design with four variants and three replications.

Several production parameters were analyzed in the experiment: the number of spikes per m², plant height, number of grains per spike, spike weight, grain weight per spike, the proportion of grains per spike, and yield per hectare. Statistical analysis of the yield of the four wheat cultivars (Apache, Moisson, Amazon, and Orovçanka), carried out through analysis of variance (ANOVA) and the Tukey HSD post-hoc test, revealed statistically significant differences among the cultivars ($p < 0.05$).

The homogeneous groups table, according to Tukey HSD, identified four distinct groups regarding the average yield: the Moisson cultivar recorded the highest yield (9614.67 kg/ha), standing out as a separate group and showing significant statistical differences compared to all other cultivars. Apache ranked second (8727.33 kg/ha), followed by Amazon (7912.67 kg/ha). Orovçanka registered the lowest yield (6865.33 kg/ha) and was classified into a distinct group, significantly separated from the higher-yielding cultivars.

The results of these analyses clearly demonstrate the impact of genetic material on the wheat's production potential. In this study, the cultivars Moisson and Apache showed superior performance and are recommended for cultivation under similar agro-ecological conditions, while the Orovçanka cultivar exhibited lower productivity.

Keywords: *testing, cultivar, variant, nutrition, indicators, yield, and significance*.

1. Introduction

Wheat (Triticum vulgare) is one of the most widely cultivated cereal crops in the world. Agricultural production represents one of the main pillars of the global economy, accounting for around 3% of the world's GDP and nearly 30% of global employment. The ten countries with the highest wheat production are: China, India, Russia, the USA, Canada, France, Pakistan, Ukraine, Germany, and Turkey. Over 350 food products are derived from wheat and are widely consumed around the world. The development of new cultivars and their testing in different ecological zones has contributed to increased global wheat yield.

In North Macedonia, wheat is a staple crop, cultivated on approximately 80,000 hectares, with an average yield of 3500 kg/ha, covering more than 40% of the population's needs for this crop.

https://doi.org/10.62792/ut.jasrd.v3.i5-6.p3012

2. Materials and Methods

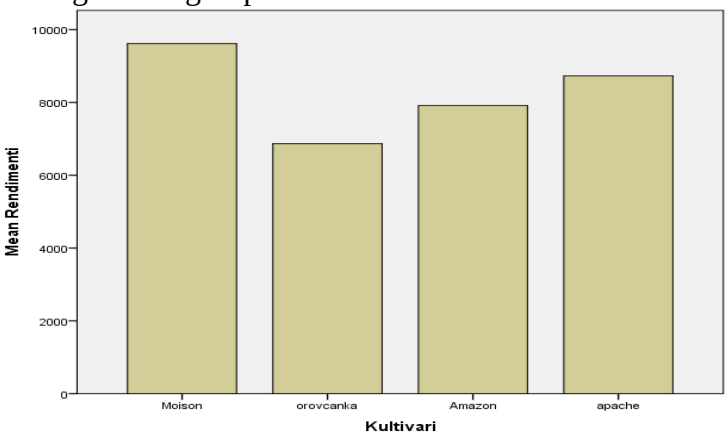
The study was conducted during the 2024 growing season and included four wheat cultivars: Moisson, Apache, Amazon, and Orovčanka. As their names suggest, these cultivars originate from different regions and possess diverse genetic backgrounds. Testing their performance is essential for evaluating their adaptability and selecting the most suitable cultivar.
The experiment was established using a randomized block design with four variants and three replications. Biometric measurements were performed, and the data were statistically processed to increase the accuracy of the conclusions and to provide reliable agronomic recommendations.

Results and interpretation

Tab.1 Descriptives
Yield

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Moison	3	9614.67	458.727	264.846	8475.13	10754.21	9085	9884
Orovcanka	3	6865.33	129.670	74.865	6543.21	7187.45	6732	6991
Amazon	3	7912.67	41.525	23.975	7809.51	8015.82	7865	7941
Apache	3	8727.33	199.415	115.132	8231.96	9222.71	8506	8893
Total	12	8280.00	1082.524	312.498	7592.20	8967.80	6732	9884

Scientific interpretation: The data show that:
Orovčanka (average = 6865.33 kg/ha) belongs to a separate homogeneous group (Group 1), recording the lowest yield and showing statistically significant differences from all other cultivars. Amazon (7912.67 kg/ha) is included in Group 2 – higher than Orovčanka, but still lower than the higher-yielding cultivars. Apache (8727.33 kg/ha) is placed in Group 3, while Moisson (9614.67 kg/ha) belongs to Group 4, exhibiting the highest yield of all cultivars and forming a separate homogeneous group.



Graph 1. Average yield

Multiple Comparisons
Dependent Variable: Yield
Tukey HSD

(I) Kultivari	(J) Kultivari	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Moison	Orovcanka	2749.333*	211.635	.000	2071.60	3427.06
	Amazon	1702.000*	211.635	.000	1024.27	2379.73
	Apache	887.333*	211.635	.013	209.60	1565.06
orovcanka	Moison	-2749.333*	211.635	.000	-3427.06	-2071.60
	Amazon	-1047.333*	211.635	.005	-1725.06	-369.60
	Apache	-1862.000*	211.635	.000	-2539.73	-1184.27
Amazon	Moison	-1702.000*	211.635	.000	-2379.73	-1024.27

	Orovcanka	1047.333*	211.635	.005	369.60	1725.06
	Apache	-814.667*	211.635	.020	-1492.40	-136.94
apache	Moison	-887.333*	211.635	.013	-1565.06	-209.60
	Orovcanka	1862.000*	211.635	.000	1184.27	2539.73
	Amazon	814.667*	211.635	.020	136.94	1492.40

*. The mean difference is significant at the 0.05 level.

The post-hoc Tukey HSD analysis revealed statistically significant differences ($p < 0.05$) in yield among the studied wheat cultivars. Moisson showed the highest yield, with statistically significant differences compared to all other cultivars: Orovčanka ($p = .000$), Amazon ($p = .000$), and Apache ($p = .013$). Furthermore, Amazon had a higher yield compared to Orovčanka ($p = .000$) and Apache ($p = .020$), while Apache also showed significantly higher values than Orovčanka ($p = .000$). Among all four cultivars, Orovčanka had the lowest yield, showing statistically significant differences from the rest

Tab.1 Yield comparison between four wheat varieties

Yield

Tukey HSD[a]

		Subset for alpha = 0.05			
Kultivari	N	1	2	3	4
orovcanka	3	6865.33			
Amazon	3		7912.67		
apache	3			8727.33	
Moison	3				9614.67
Sig.		1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3.000.

According to the table, Moisson recorded the highest yield (9614.67 kg/ha), forming a separate group (Group 4), and was statistically superior to all other cultivars. Apache (8727.33 kg/ha) and Amazon (7912.67 kg/ha) also showed higher yields than Orovčanka and were placed in different groups, indicating significant statistical differences between them. Orovčanka had the lowest yield (6865.33 kg/ha) and was alone in Group 1.

The Tukey HSD test grouped the cultivars into four distinct, non-overlapping homogeneous groups, reinforcing the evidence of significant differences among them.

3. Conclusions

The results of this analysis demonstrate the impact of genetic material on the productive potential of wheat. In this study, Moisson and Apache showed superior performance and are recommended for cultivation under similar agro-ecological conditions, whereas Orovčanka exhibited the lowest productivity.

In conclusion, the yield of wheat cultivars varies significantly at a statistical level, with Moisson performing the best, followed by Apache, Amazon, and lastly Orovčanka. These differences are crucial for selecting cultivars with higher production potential in agricultural practice.

All four cultivars show statistically significant yield differences, with Moisson being the best performer.

For selecting high-yielding wheat cultivars, Moisson should be the first choice.

Apache and Amazon can be considered good intermediate alternatives.

Orovčanka, due to its lower yield, may not be an optimal choice for maximum production purposes.

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