

## **Bread Quality and Organoleptic Indicators of Triticale Varieties Grown in the Khorezm Region**

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**Abstract:** This article aims at determining the bread quality of 11 triticale varieties grown in the soil climate of Khorezm region, by making bread from a mixture of triticale flour with wheat flour in a ratio of 20/80, 50/50 and from 100% triticale flour. Organoleptic characteristics such as the appearance of the bread, the condition of the bread crumbs, the porosity and taste of the bread crumbs were determined. As a result, it is determined that the varieties Sergey, Odyssey and GulDU have relatively high levels of bread quality, high organoleptic characteristics such as their shape, bread surface structure, the color of bread surface, elasticity and color of bread crumbs, taste and porosity of bread crumbs. The flour obtained from these varieties is recommended to use in confectioneries.

**Keywords.** Triticale, variety, bread quality, flour, organoleptic indicators.

### **Introduction**

Winter triticale, carrying the genes of its parental forms, has taken both the positive properties of wheat and rye (a significant amount of protein, presence of gluten, content of biologically active aromatic substances) and negative (a large amount of soluble albumin and globulin proteins and especially high activity of amylolytic enzymes). The weather conditions during

the vegetation, as well as the varietal characteristics of this grain crop are of great influence on the grain quality [2].

Garne and Raritet wheat-rye amphidiploids, developed by Ukrainian breeders, were found to have a bread yield of 26–39% and a bread quality of 180–190% [5].

Mainly, triticale flour serves as an ingredient in the manufacture of confectionery products (cakes, biscuits, waffles). Most varieties of triticale are unsuitable for baking a bread because they have weak gluten, but they can produce a product with a unique taste and flavor when used in combination with wheat and other cereals [4]. Some researchers emphasize the need for a special approach to baking triticale bread and recommend the use of 70% high-grade wheat flour and 30% triticale flour. The triticale-wheat bread obtained as a result of such a mixture is distinguished by a large volume of the finished product and has an excellent taste and aroma [3].

In our previous research, we studied the characteristics of 11 triticale varieties grown in the soil climate of Khorezm region, such as grain nature, total protein, amount of wet and dry gluten, deformation of gluten, amino acid composition [1]. In this study, laboratory experiments were conducted to study the quality of bread made from grains of these triticale varieties.

### **Research objects and methods**

Aiming at determining the degree of bread quality in triticale varieties, bread was made from the triticale flour of Tikhon, Sergey, Odyssey, Valentin, Swat, Prag Serebristiy, Farkhod, Sardor, Tuyimli, GulDU and Dustlik varieties, mixed with wheat flour in 20/80, 50/50 ratios and from 100% triticale flour. Organoleptic characteristics of baked breads, such as appearance (shape, structure of bread surface, color of bread surface), condition (color and elasticity) of bread crumbs, porosity and taste of bread crumbs were determined on the basis of “GOST 27669-88 Measurement of the volumetric yield of

bread” [6]. The experiments were performed in the laboratory “Grain crops and products analysis” of the Khorezm Mamun academy.

## Result and discussion

Bread was made from triticale varieties and their technological quality indicators were studied. Prior to the analysis of technological quality in baked bread, the bread was cooled for 16–20 h. Later organoleptic parameters such as the appearance of the bread, the condition of the bread crumbs, and the porosity of the bread crumbs were studied.

**Picture 1. General appearance of breads made from triticale**



varieties.

In baking, a mixture of triticale-wheat flour was obtained in three homogeneous proportions (100% triticale flour, 50/50% triticale-wheat flour, and 20/80% triticale-wheat flour). They were compared with the bread made of the soft winter wheat variety Krasnodar-99 obtained as a control (Picture 1).

In the study of the appearance of bread made from triticale flour, it was evaluated in terms of such characteristics as the shape, structure of the bread surface and the color of the bread surface, in comparison with the soft wheat of Krasnodar-99 variety. When comparing the shape of breads made from 100% triticale flour, it was found that the shape of bread made from the flour of Tikhon, Sergey, Farkhod, Sardor, Odyssey, Valentin, Tuyimli, GulDU varieties

was straight and the bread shape of Swat, Prag Serebristiy, Dustlik varieties was crooked (Table 1). When studying the structure of the bread surface, it was found that the bread surface of Krasnodar-99, Sergey, GulSU, Odyssey, Farkhod, Valentin varieties is flat, Tikhon, Sardor, Tuyimli, Swat, Prag Serebristiy, Dustlik varieties have uneven bread surface. In terms of bread surface color, Krasnodar-99, Sergey, Tikhon, GulDU, Prag Serebristiy, Dustlik breads have a light brown color, Odyssey, Farkhod, Valentin, Sardor, Swat breads has a brown surface and only Tuyimli bread has a dark brown color.

**Table 1**  
**The ratio of Triticale flour - 100%**

Organoleptic characteristics of bread				
No	The name of varieties	Appearance of bread		
		Form	Structure of bread form	Color of bread surface
1	Krasnodar-99	Straight	Flat	Light brown
2	Sardor	Straight	Uneven	Brown
3	Swat	Crooked	Uneven	Brown
4	Sergey	Straight	Flat	Light brown
5	Tikhon	Straight	Uneven	Light brown
6	Tuyimli	Straight	Uneven	Dark brown
7	GulDU	Straight	Flat	Light brown
8	Odyssey	Straight	Flat	Brown
9	Prag Serebristiy	Crooked	Uneven	Light brown
10	Dustlik	Crooked	Uneven	Light brown
11	Farkhod	Straight	Flat	Brown
12	Valentine	Straight	Flat	Brown

Organoleptic characteristics of bread			
Condition of bread crumbs		Porosity of bread crumbs	
Color	Elasticity	Size of pores	Homogeneity of pores
White	Good	Big pores	The same

Gray-white	Moderate	Moderate pores	The same
Gray-white	Moderate	Moderate pores	Not the same
Gray-white	Moderate	Moderate pores	Not the same
White	Good	Big pores	Not the same
Dark brown	Good	Big pores	The same
Gray-white	Good	Moderate pores	Not the same
White	Good	Moderate pores	The same
Brown	Moderate	Moderate pores	Not the same
Gray-white	Good	Moderate pores	Not the same
White	Good	Big pores	The same
White	Good	Moderate pores	The same

The condition of the bread crumbs was mainly studied by comparing the two indicators in terms of color and elasticity (Picture 2). The color of bread crumbs was white in Krasnodar-99, Tikhon, Odyssey, Farkhod, Valentin varieties, and bread crumbs of Sardor, Swat, Sergey, GulDU, Dustlik varieties were gray white, the crumb of Prag Serebristiy variety was brown and bread crumbs of Toyimli variety were dark brown. Krasnodar-99, Tikhon, Tuyimli, GulSU, Odyssey, Dustlik, Farkhod, Valentin varieties were rated as good in terms of elasticity, while Sardor, Swat, Sergey and Prag Serebristiy varieties were found to have moderate elasticity.

Figure 2. Transversal cut of baked bread



The porosity of the bread crumbs was also determined using two indicators. The first indicator was the size of the pores, while Krasnodar-99, Tikhon, Tuyimli, Farkhod varieties formed large pores, the remaining varieties were moderately porous. The second indicator was the homogeneity of bread crumbs' porosity, according to the observations, the homogeneity of bread crumbs' porosity was the same in Krasnodar-99, Sardor, Odyssey, Tuyimli, Farkhod and Valentin varieties, but in other varieties, it was not the same.

Comparing the shape of breads made from 50/50% triticale flour, it was found that the bread shape of Krasnodar-99, Tikhon, Sergey, Farkhod, Sardor, Odyssey, Valentin, Tuyimli, GulDU, Swat, Prag Serebristiy varieties was correct and the bread shape of Dustlik variety was crooked (Table 2). When studying the structure of the bread surface, it was found out that the bread surface of Krasnodar-99, Sardor, Tikhon, Odyssey, Farkhod, Valentin varieties is flat, GulDU, Tuyimli, Svat, Sergey, Prague Cerebristiy, Dustlik varieties have uneven bread surface. When evaluated by the color of the bread surface, it was found that the bread surface color of Krasnodar-99, Sardor, Sergey, Tikhon, GulDU, Odyssey varieties was white, the bread surface of Swat, Dustlik varieties was gray-white, the bread surface of Tuyimli variety is light brown, the bread surface color of Prag Serebristy, Farkhod, Valentin varieties was observed to be brown.

**Table 2**  
**The ratio of Triticale flour - 50/50%**

No	The name of varieties	Organoleptic characteristics of bread		
		Appearance of bread		
		Form	Structure of bread form	Color of bread surface
1	Krasnodar-99	Straight	Flat	Brown
2	Sardor	Straight	Flat	Dark brown
3	Swat	Straight	Uneven	Brown
4	Sergey	Straight	Uneven	Light brown



5	Tikhon	Straight	Flat	Brown
6	Tuyimli	Straight	Uneven	Light brown
7	GulDU	Straight	Uneven	Brown
8	Odyssey	Straight	Flat	Brown
9	Prag Serebristiy	Straight	Uneven	Light brown
10	Dustlik	Crooked	Uneven	Light brown
11	Farkhod	Straight	Flat	Brown
12	Valentine	Straight	Flat	Brown

### Organoleptic characteristics of bread

Condition of bread crumbs		Porosity of bread crumbs	
Color	Elasticity	Size of pores	Homogeneity of pores
White	Good	Big pores	The same
White	Moderate	Big pores	Not the same
Gray-white	Good	Big pores	The same
White	Moderate	Moderate pores	The same
White	Good	Moderate pores	The same
Light brown	Good	Big pores	Not the same
White	Moderate	Moderate pores	The same
White	Good	Moderate pores	The same
Brown	Moderate	Big pores	Not the same
Gray-white	Moderate	Moderate pores	The same
Brown	Moderate	Moderate pores	The same
Brown	Moderate	Moderate pores	The same

The color of bread crumbs was white in Krasnodar-99, Sergey, Swat, Tikhon, GulDU, Odyssey varieties, the color of bread crumbs of Sardor, Dustlik varieties was gray-white, the color of Prag Serebristiy, Farkhod, Valentin varieties was brown and bread crumb of Tuyimli variety was light brown. Krasnodar-99, Tikhon, Tuyimli, Odyssey varieties were rated as good in terms of elasticity of bread crumbs, the remaining varieties had moderate elasticity.

Krasnodar-99, Sardor, Swat, Tuyimli, Prague Cerebrist varieties produced large pores in terms of the size of the pores, while the remaining varieties were

moderately porous. Homogeneity of bread crumbs' porosity was observed in Krasnodar-99, Swat, Sergey, Tikhon GulDU, Odyssey, Dustlik, Farkhod and Valentin varieties, and not in other varieties.

Comparing the shape of breads made from 20/80% triticale flour, it was found that the bread shape of Krasnodar-99, Tikhon, Sergey, Farkhod, Sardor, Odyssey, Valentin, Swat, Prag Serebristiy, Dustlik varieties was straight and bread shape of Tuyimli, GulDU varieties was crooked (Table 3 ). When studying the structure of the bread surface, it was found out that the bread surface of Krasnodar-99, Sardor, Swat, Tikhon, Tuyimli, GulDU, Farkhod, Valentin varieties is flat, the bread surface of Sergey, Odyssey, Prag Serebristiy, Dustlik was uneven. The bread surface color of Krasnodar-99, Tikhon, GulDU varieties is light brown, bread color of Sardor, Sergey, Odyssey, Dustlik was brown, the color of Swat, Nutritious, Prag Serebristiy, Farkhod, Valentin was dark brown.

**Table 3**  
**The ratio of Triticale flour -20/80%**

No	The name of varieties	Organoleptic characteristics of bread		
		Appearance of bread		
		Form	Structure of bread form	Color of bread surface
1	Krasnodar-99	Straight	Flat	Light brown
2	Sardor	Straight	Flat	Brown
3	Swat	Straight	Flat	Dark brown
4	Sergey	Straight	Uneven	Brown
5	Tikhon	Straight	Flat	Light brown
6	Tuyimli	Crooked	Flat	Dark brown
7	GulDU	Crooked	Flat	Light brown
8	Odyssey	Straight	Uneven	Brown
9	Prag Serebristiy	Straight	Uneven	Dark Brown
10	Dustlik	Straight	Uneven	Brown
11	Farkhod	Straight	Flat	Dark brown



<b>12</b>	Valentine	Straight	Flat	Dark brown
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Organoleptic characteristics of bread			
Condition of bread crumbs		Porosity of bread crumbs	
Color	Elasticity	Size of pores	Homogeneity of pores
<b>White</b>	Good	Big pores	The same
<b>Gray-white</b>	Moderate	Moderate pores	The same
<b>White</b>	Moderate	Moderate pores	The same
<b>White</b>	Moderate	Moderate pores	The same
<b>White</b>	Good	Big pores	The same
<b>Dark brown</b>	Good	Big pores	Not the same
<b>White</b>	Good	Moderate pores	The same
<b>Grayish</b>	Good	Moderate pores	The same
<b>Grayish</b>	Moderate	Moderate pores	Not the same
<b>White</b>	Good	Moderate pores	The same
<b>Brown</b>	Good	Moderate pores	The same
<b>Grayish</b>	Good	Moderate pores	The same

The color of the bread crumbs was white in Krasnodar-99, Swat, Sergey, Tikhon, GulDU, Dustlik varieties, the color of the bread crumbs of Sardor variety was gray white, the color of crumbs of Farkhod variety was brown and the bread crumbs of Tuyimli variety were dark brown, the color of Prag Serebristiy, Odyssey and Valentin varieties was grayish. Krasnodar-99, Tikhon, Tuyimli, GulDU, Odyssey, Dustlik, Farkhod and Valentin varieties were rated as good in terms of elasticity of bread crumbs, while the remaining varieties had moderate elasticity.

The Krasnodar-99, Tikhon, and Tuyimli varieties produced large pores in terms of the size of the pores, while the remaining varieties were moderately porous. In terms of homogeneity of bread crumbs' porosity, it was observed that Krasnodar-99, Swat, Sergey, Sardor, Tikhon GulDU, Odyssey, Dustlik,

Farkhod and Valentin varieties were the same, Tuyimli and Prag Serebristiy varieties were not the same.

The taste of the baked breads from the triticales varieties had a taste close to that of wheat bread. In baking, it is advisable to bake bread from Sardor, Swat and Tikhon varieties with the addition of 20/80% triticales-wheat flour.

**Conclusions.** Sergey, Odyssey and GulDU varieties have a relatively high level of bread quality, when the flour from their grains was mixed with wheat flour in a ratio of 20/80, 50/50 and when 100% triticales flour was used to make bread, the appearance of bread (shape, structure, bread surface color), the condition (color and elasticity) of the bread crumbs, the porosity and taste of the bread crumbs were found to be high. It is recommended to use flour of Sergey, Odyssey and GulDU varieties in confectioneries.

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