THE INFLUENCE OF GROWING CONDIDIONS AND STORAGE PERIODS OF WINTER WHEAT ON RHEOLOGICAL AND BAKING PROPERTIES OF FLOUR

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The influence of growing conditions and shelf life of winter wheat on rheological and baking properties of flour. Optimal performance alveohrafa was observed after six months of storage of grain grown for all farming systems. The highest rheological and baking properties throughout the storage period was characterized by wheat grown after peas for industrial and ecological farming systems.

Key words: *grain winter wheat; farming systems; predecessors; periods storage; rheological and baking properties.*

Current trends in the food industry that are influenced by the growing consumer demand for food products that are produced exclusively from natural ingredients, manufacturers orient to the cultivation of environmentally safe and friendly products. In this regard, the real version of farming systems in the area of greening the near future will be a model of ecological agriculture [1, 6]. Simultaneously wheat grown under ecological farming systems must have high technological and baking performance.

Evaluating wheat flour, of particular importance for mechanized and automated bakery production with rheological (physical) properties of the test, including its stability against mechanical impact. Bakery production requires that the dough during mechanical treatments of the batch during fermentation is not worsened their basic properties (elasticity, elasticity) and hearth bread retain its shape [2-4, 6].

Therefore, the final and very important stage of winter wheat research is to determine the baking properties of flour by laboratory trial batch. Estimation of

baked product consists of determining the amount of bread, its shape, color and surface pulp, elasticity, elasticity, porosity, odor and taste [2, 5].

The aim of our researches was to investigate the influence of the factors of growth and longevity of winter wheat on rheological and baking properties of flour.

Material and methods research. The study was conducted during 2011-2013. With a grain of winter wheat grown in the fields of the Department of Agriculture and herbology. For the analysis of selected samples Woodland 90 variety grown on perennial grasses, peas and corn silage for industrial, environmental and biological farming systems.

Grain was stored in granaries normal conditions and evaluated in the laboratory of technology of storing, processing and product standardization Ya. prof. BV Lesik National University of Life and Environmental Sciences of Ukraine. The program of research quality assessment predicted before storage (control), after one, three, six, nine and twelve months of storage units.

Tests carried out in accordance with the procedures of national standard: ISO 4111.4-2002 Flour. Physical characteristics of the test. Part 4: Determination of rheological properties alveohrafom (ISO 5530-4: 1991, MOD).

Results. One of the most common devices of technological laboratories, which determine the physical properties of the test, including its strength W, the elasticity of P, elongation (elasticity) L and their ratio P / L is alveohraf Chopin. Change the studied parameters during storage of winter wheat grown under different farming systems shown in the table.

Changing rates alveohrafa during storage of winter wheat grown under different farming systems (average for 2011-2013).

Farming systems	shelf life, (mns.)	Index of alveohraf			
		resilience, mm	extensibility, mm	Configurations of alveograms	power of flour, o.a.
Industrial (control)	Before storage (control)	83	211	0,40	221
	6	94	224	0,42	322
	12	91	212	0,43	257
Ecological	Before storage (control)	80	220	0,37	214
	6	90	230	0,40	282
	12	83	198	0,42	234
Biological	Before storage (control)	69	166	0,42	195
	6	85	210	0,41	269
	12	76	187	0,41	215

Analyzing the data table can be concluded that the elasticity of the dough when laying on grain storage was higher than industrial farming system - 83 mm, while the flour obtained from grain by the other two systems had poorer initial performance. In particular ecological system under study rate was 80 mm, and the biological - 69 mm.

Within 6 months of storage, the quality of flour obtained for all farming systems, substantially improved compared to the initial data has increased the elasticity of dough.

For strong wheat elasticity must be at least 80 mm. Thus, we can conclude that the flour obtained from grain grown for environmental and industrial farming system had the characteristics of strong wheat.

After 12 months of storage units observed a significant decrease in the elasticity of dough, in particular biological system - 9, ecological - 7 and Industry 3 mm. .

However, the ratio of the elastic dough its elasticity, which is also known configuration alveohramy was in favor of the biological system. The resulting index of 0.42 was far from the optimum value – 0.8-1.4. During the first six months of storage units for biological system configuration alveohramy decreased by 0.04, and for the industry, by contrast, increased by 0.02 compared with those obtained for the storage of flour. This is due to decreasing elasticity of the dough for long-term storage of grain elasticity elasticity ratio increased and was 0.40-0.42 regardless of farming systems. However, the highest growth rate recorded for the ecological system.

Extensibility test is not the primary indicator of quality wheat flour, but it has a significant impact both on the strength of flour, and the configuration alveohramy. The highest initial value of this indicator was obtained in a sample of flour derived from grain grown for ecological farming system - 220 mm. During the first six months of storage in all the studied samples increased extensibility of dough, but with varying intensity depending on the farming system. Most of it is grown on a biological farming system (44 mm).

Last year storage units extensibility of dough, which is characterized by a maximum amount of bullets at the time of rupture decreased only during this period was no more than 187-212 mm in all variants of the experiment.

Power of flour characterized by specific work spent on deformation of 1 g of dough as much as a thin film and is determined by multiplying the value of the area outlined alveohramoyu the equivalent of (in units alveohrafu) 1 cm2 of the chart and dividing by the average mass of the deformed disk of dough.

Specific deformation test ranged from 30 to 800 AA In our studies, during the first six months of storage units studied parameters increased: in biological systems - 74, environmental - 70, Industrial - 101 OA, after twelve months of storage significantly decreased by 54; 50 and 69 – AA

The most important indicators of the quality of bread is its volume and porosity, and summarizing - the total baking score (points) where in addition to the volume estimate appearance (shape, surface, color crust) and crumb (color porosity, elasticity, taste) bread. In this evaluation system of nine used. The results obtained revealed the use in bread baking grown under different wheat that was stored for a long chasu.o.a. By keeping the highest overall assessment was baking flour from grain grown on perennial grasses and peas for industrial and ecological farming systems, respectively - and 6.26-6.22 – 6.15-6.21 points (Figure).

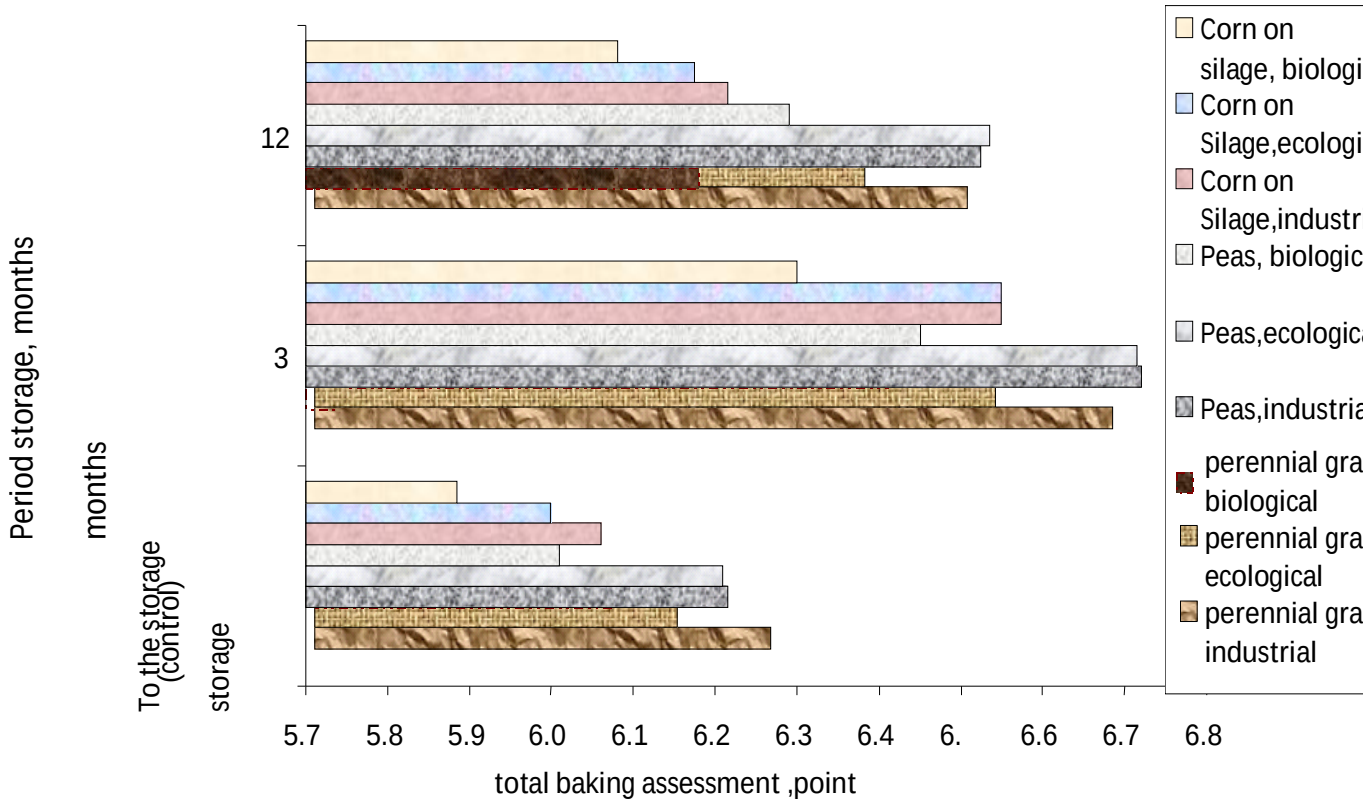

Figure dynamics of the overall evaluation of the baking of bread flour, depending on the predecessor, farming systems and shelf-life of winter wheat (2011-2013.)

Almost identical was the overall score baking grain received after corn silage for all farming systems – 6.89-6.06 points.

In the process of storing grain bread quality improved and investigated index increased: after corn silage - on 0.42-0.55 points after perennial grasses - at 0.34-0.42 and after peas - on 0.44-0.51 points. This led to the highest overall assessment

of baking bread, obtained from wheat grown after peas for industrial and ecological farming systems - 6.72 points.

Total score baking flour slightly decreased at 12 months of storage of grain grown after peas predecessor (at 0.16-0.20 points) and perennial grasses (at 0.16-0.23 points), and a few zbilshelasya after corn silage (on 0.22-0.38 points). The highest overall assessment bread 12 month storage observed in corn grown after perennial grasses and peas for industrial and ecological farming systems – 6.50-6.54 points.

Analysis of variance of changes in the overall assessment of baking bread during storage of winter wheat showed the most significant effect on this index term storage especially after perennial grasses (Fr = 98.54> $F_{crit.}$ = 6.94) and somewhat lower after the peas and corn (Fr = 90.17-84.24> $F_{crit.}$ = 6.94). Considerable influence of farming systems, especially after predecessor pea (Fr = 84.43> F_{crit} = 6.94) and less precursors (Fr = 11.85-9.58> F_{crit} = 6.94).

Conclutions

1. Optimal parameters alveohrafa (eg 78-96 mm resilience and strength of flour AA 264-328) was found after six months of storage units for all farming systems.

2. The highest total score baking flour from grain grown on perennial grasses and peas for industrial farming systems to storage (6.26-6.22 points) and for ecological farming systems (6.15-6.21 points). During storage units studied figure rose – 0.34-0.55 points, which contributed the highest overall assessment of baking bread from flour from grain grown after peas for industrial and ecological farming systems (6.72 points). At the end of storage the total baking score slightly decreased, and the highest scores were obtained grain grown on perennial grasses and peas for industrial and ecological farming systems – 6.50-6.54;

3. Statistical analysis of data dynamics baking quality indicators during storage of winter wheat showed the greatest impact on this figure shelf life and somewhat smaller predecessor and farming systems.

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ВПЛИВ УМОВ ВИРОЩУВАННЯ І ТЕРМІНУ ЗБЕРІГАННЯ ЗЕРНА ПШЕНИЦІ ОЗИМОЇ НА РЕОЛОГІЧНІ І ХЛІБОПЕКАРСЬКІ ВЛАСТИВОСТІ БОРОШНА

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Досліджено вплив умов вирощування і терміну зберігання зерна пшениці озимої на реологічні та хлібопекарські властивості борошна. Оптимальні показники альвеографа відзначали після шести місяців зберігання зерна, вирощеного за всіх систем землеробства. Найвищими реологічними і хлібопекарськими якостями протягом усього періоду зберігання характеризувалося зерно пшениці, вирощене після гороху за промислової і екологічної систем землеробства.

Ключові слова: *зерно пшениці озимої, борошно, системи вирощування, попередники, термін зберігання, реологічні і хлібопекарські властивості.*

ВЛИЯНИЕ УСЛОВИЙ ВЫРАЩИВАНИЯ И СРОКОВ ХРАНЕНИЯ ЗЕРНА ПШЕНИЦЫ ОЗИМОЙ НА РЕОЛОГИЧЕСКИЕ И ХЛЕБОПЕКАРНЫЕ СВОЙСТВА МУКИ

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Исследовано влияние условий выращивания и сроков хранения зерна пшеницы озимой на реологические и хлебопекарные свойства муки. Оптимальные показатели альвеографа отмечены после 6-ти месяцев хранения зерна, выращенного при всех системах земледелия. Высшими реологическими и хлебопекарными свойства на протяжении всего времени хранения характеризовалось зерно пшеницы, выращенное после предшественника гороха при промышленной и экологической системах земледелия.

Ключевые слова: *зерно пшеницы озимой, мука, системы выращивания, предшественник, срок хранения, реологические и хлебопекарные свойства*