



IMPROVEMENT OF PRODUCTION TECHNOLOGY OF NATIONAL FLAT BREAD ENRICHED WITH VEGETABLE EXTRACTS

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ABSTRACT

Addition of vegetable extracts to the formulation of national flat bread and wheat flour favorably affects all indicators of finished products, especially taste, aroma and porosity. Dispersion of vegetable extracts with a particle size of 180 microns has special effect. Use of wheat flour with vegetable extracts in bread formulation allows reducing the time of final dough tinting by 5 minutes. It is established that the most effective method of enrichment of wheat flour flat bread is application of vegetable extracts in the form of the mixture.

KEYWORDS. *National flat bread, wheat flour, vegetable extracts, quality indicators, physical-chemical characteristics.*

INTRODUCTION

The problem of increasing the nutritional and biological value of food products, including bakery products, shows the feasibility of improving their chemical composition, eliminating deficiencies in individual components, enriching with full-fledged proteins, vitamins, minerals and food fibers [1-4]. Effective way to solve this problem is to use as

additives highly protein products of plant origin, in particular, products of processing of some plant species [5-6].

Vegetable extracts based on “Unabi” (zizifus), and “Carolina” (kaspiskaya) plant processing products are one of the main protein-oil containing. Seeds of these plants on average contain about 50% fatty oil and more than 35% full value



protein with high content of essential amino acids, vitamins, minerals and dietary fibers [7-8].

Formation of healthy diet based on the concept of balanced food substances dictates the need to create products with increased nutritional value.

One of the directions of enhancement of food value of products, in particular bakery products, is usage of additives from biologically valuable vegetal raw materials in technologies and formulations [9-10]. Foreign and domestic scientists made a great contribution to the development of technologies of enriched bakery products [11-13].

Vegetable extracts obtained by processing some plants are rich source of biological active substances [14-15]. Vegetable extracts, in particular, "Unabi" (zizifus), and "Carolina" (kaspiskaya) differ in their technological and functional properties from known and traditional raw materials [7-8] of bakery production.

In this regard, scientific and practical research on the use of new types of vegetable extracts in the technology of production of national Uzbek flat bread is relevant.

The aim of the work is to improve the technology for the production of national flat bread enriched with vegetable extracts. Vegetable extracts are obtained by processing the terrestrial part of the plants "Unabi" (zizifus), and "Carolina" (kaspiskaya) [15-16].

Uzbek flat bread [18-19] was chosen as national bakery product.

The raw materials used met following current standards:

- Bakery wheat flour of the first grade (GOST 52189-2003);
- pressed bakery yeast (GOST 171-81);
- Table food salt (GOST R 51574-2000);
- Potable water (GOST 51232-98);

Content of weight fraction of moisture, protein, fat, fiber and mineral substances was determined in examination of chemical composition of raw materials of vegetable extracts [16-17].

Products were analyzed 16-18 hours after baking according to physical-chemical and organoleptic parameters.

Organoleptic indices of finished flat breads (appearance, condition of flesh, taste, smell) were determined in accordance with GOST 27669-88

Humidity of finished products was determined in accordance with GOST 21094-75 by drying in a SES drying shelf.

Acidity of finished products was determined in accordance with GOST 5670-96 by titration of suspension of a crumb with 0.1N NaOH solution and expressed in degree.

Porosity of finished products was determined according to GOST 5669-96.

Specific volume of finished products and their shape stability were determined according to the procedure in accordance with GOST 27669-88.

To improve the technology of production of national Uzbek flat bread with using plant extracts, laboratory baked goods were tested. The dough was prepared in leaven method. The products were baked with a weight of 400 g. Vegetable extracts were added to the dough in amount of 1-5%. Samples prepared without vegetable extracts served as control samples. The quality assessment of the finished bakery products was carried out 16-18 hours after baking.

At the first stage, the influence of vegetable extracts on the organoleptic indicators of the quality of the finished product was determined by means of tasting. In this case, a 20 point scale was used [17]. The results obtained during the tasting are presented in Table 1.

Analysis of the results of the organoleptic evaluation of the samples showed that the introduction of vegetable extracts into formulations of national flat bread made from wheat flour has a beneficial effect on all parameters of finished products, especially taste, aroma, and porosity. Samples with the introduction of vegetable extracts 1-3% by weight of flour have a total score higher than that of control samples. Particular attention should be paid to the dispersion of vegetable extracts. Extracts with a particle size of more than 180 microns leads to a sharp deterioration in such indicators as taste and crumb condition. The largest discrepancy in the overall assessment of products with vegetable extracts compared with the control sample was 24%. This is due to higher ratings of indicators such as appearance, crumb condition, aroma and taste, which in turn is due to the chemical composition of the vegetable ingredients introduced, rich in easily digestible carbohydrates, organic acids, pectin substances, etc.

With an increase in the content of vegetable extracts over 3%, there is a deterioration in organoleptic characteristics. The taste and smell of the flat bread become harsh, and a pronounced aftertaste appears. The intensity of the color of the crusts and crumbs of the cakes increases, the color becomes darker. Chewing ability worsens, and the crumb becomes rough.

To substantiate the fermentation time of the dough, the effect of vegetable extracts, introduced in amount of 2.4% of the flour mass, on the acidity of the dough was studied. It was found that after 55 minutes the dough has an acidity of 3 degrees, while the control sample reaches the specified acidity after 90 minutes.

MATERIALS AND METHODS

To determine the temperature and time of the final proofing of dough semi-products with vegetable extracts, the influence of the temperature inside the final proofing cabinet on the dynamics of gas formation was studied (Fig. 1).

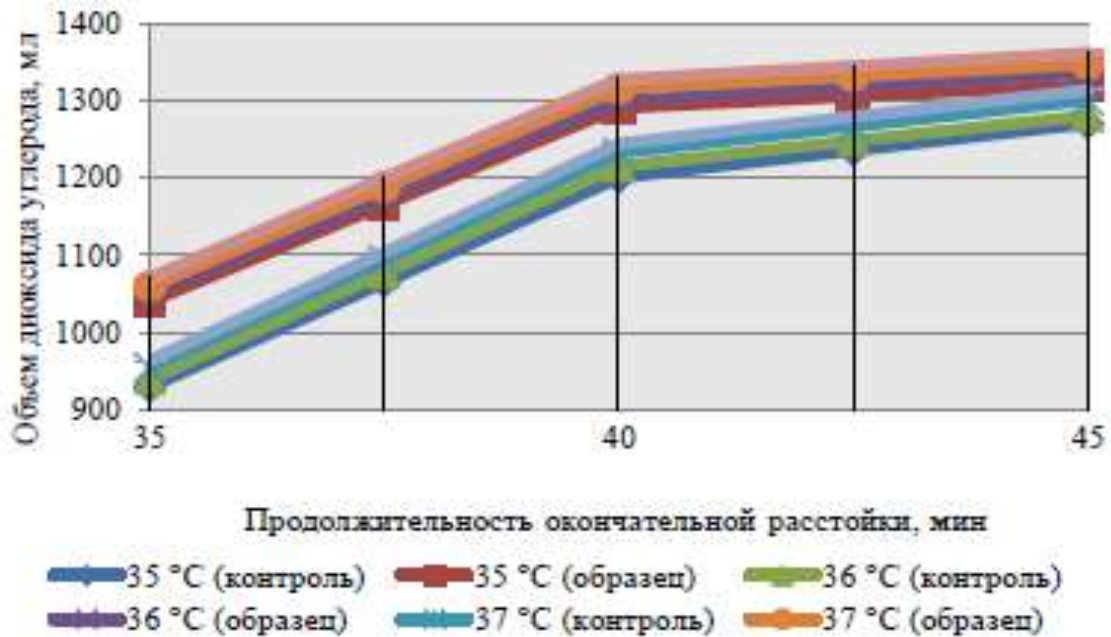


Figure 1. Dynamics of gas formation at the stage of final proofing at different temperatures inside the proofing cabinet

Figure 1 shows that at a temperature of 36° C, the formation of gas in the dough with vegetable extract reaches the desired value after 40 minutes from the start of the final proofing. Further temperature rise does not have a significant effect on the release of carbon dioxide; the maximum change in the gas formation value was 28ml. This increase does not significantly affect the volume and porosity of the finished products.



Table 1
Characteristics of simple Uzbek flat breads

Indicator	Kashgar-non bread, kg		Obi-non bread, kg		Pulati-non bread, kg		Lochira-non bread, kg		Uy-non bread, kg			
	0.2	0.4	0.2	0.4	0.2	0.4	0.2	0.4	0.2			
Appearance: surface	Patterned, densely sprinkled with sesame seeds, with a slight thickening of the edge, not wrinkled		Smooth, with a slight edge thickening, the edge of the thickened part of the flat bread is pinned with a chekich in the form of a pattern along the entire circumference of the bread. In the center, it is punctured with a chekich once, not wrinkled		Patterned, with thickened steep or ribbed edges, not wrinkled		Smooth, with thickened edges. The middle is pricked in 3 places, not wrinkled		Smooth, with a slight thickening of the edge, the edge of the thickened part of the cake is pricked with a chekich			
Shape and size, cm	Round, without imprints, no dark bulges						Round or curly, without dark spots		Round, without prints and dark bulges			
Outer diameter	16-17	20-21	18-19	22-23	16-17	21-22	14-16	18-20	16-17	18-20	15-16	
Inner diameter			14-15		19-20							
Middle thickness	1.5-2.0	1.0-1.5	0.8-1.0		1.0-1.2	1.0	1.5	1.5	2.0		1.0	
Edge thickness	3.0-3.5	2.0-2.5	1.5-2.0		2.0-2.5	2.5	3.0	3.0	3.0		2.5-3.0	
	3.0-3.5	2.5-3.0										
Coloration	Uniform, from yellow to light brown, slight stains off the surface						Pale, not burnt, without contamination of crusts, light brown in color					
Crumb condition:	Well baked, no temper											
Baked												
Knead	No lumps and traces of no-knead											
Porosity	Uniform, finely porous											
Freshness	Fresh, non-stale, not crumbly											
Taste and smell	Typical of this type of flat bread, with light onion aroma and taste		Typical of this type of flat bread,				With no side tastes and smell					
Crumb moisture,% no more	40	42	30	32	39	39	33	35	40	40	35	
Acidity, degree, no more	3.0	3.0	2.5	2.5	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Fat content in terms of weight,%	2.2	2.2	2.0	2.0	-	-	2.0	2.0	-	-	7.0	
Sugar content in terms of weight,%	-	-	-	-	-	-	4.0	1.0	-	-	-	
Point score												
Control	16		18		16		18		20		22	
Experiment	20		22		20		22		22		22	



The amount of carbon dioxide in the control sample, which should be at the beginning of baking, is reached at a temperature of 37°C after 45 minutes from the moment of the beginning of the final proofing. Thus, the use of wheat flour with vegetable extracts in the formulation of the flat bread allows reducing the final proofing time by 5 minutes compared to the traditional technology.

Based on the analysis of a set of experimental data, the modes of individual technological stages were determined (Table 2) and technological scheme for the production of wheat flour flat bread enriched with vegetable extracts was developed (Fig. 2)

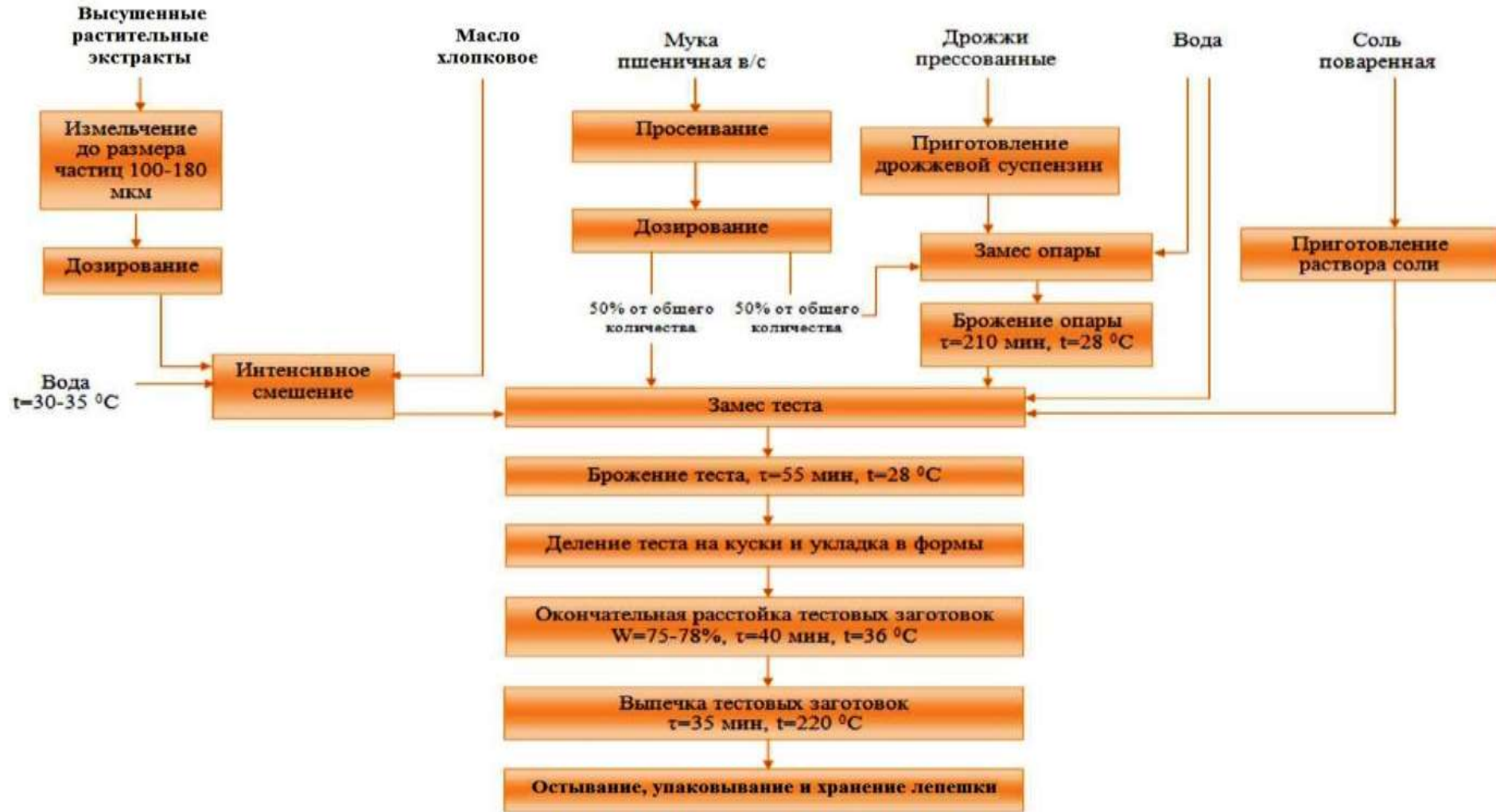


Figure 2. Technological scheme for the production of wheat flour flat bread with vegetable powders mixed with cottonseed oil



Table2
Technological parameters for the production of wheat flour flat breads with vegetable extracts

The name of technological stage and mode	Parameters of technological mode	
	control	wheat flour flat bread with vegetable extracts
Leaven preparation mode:		
Dough moisture,%	47	47
Temperature, °C	28	28
Fermentation duration, min	210	210
Doughpreparation mode:		
Dough moisture,%	44	44
Temperature, °C	28	28
Fermentation duration, min	90	55
Dough proofing mode:		
Temperature, °C	37	36
Air relative humidity, %	75-78	75-78
Duration, min, flat bread	45	40
Bread baking mode:		
Temperature of the steam-air mixture, °C	220	220
Duration, min	35	35

Technological scheme consists of the following stages: preparation of raw materials for production, preparation of leaven and dough, cutting dough pieces, baking, cooling, packaging and storage of the flat bread (Fig. 2)

Preparation of raw materials for production is carried out as follows: wheat flour is sieved and cleaned from metal impurities after which it is weighed and sent to the batch of semi-products; yeast is introduced in the form of suspension, for the preparation of which they are diluted with water at temperature of 29-32 °C (3-4 parts of water are added to 1 part of yeast); table salt is dissolved in water (the density of the salt solution should be 1.18-1.20 g/cm³), the solution is filtered, and then fed into the supply tanks; vegetable extracts are crushed in a hammer mill, after which they are weighed.

Based on the studies carried out, it has been established that the most effective way of enriching wheat flour flat bread is to add vegetable extracts in the form of mixture. For this, vegetable extracts were added to water with a temperature not higher than 40°C with a component ratio of 2.6:1.5:1, respectively. The mixture was stirred vigorously for 5-7 minutes.

Prepared wheat flour and pressed bakery yeast were sent to dough kneading. It was prepared with a moisture content of 44-48% from 50% wheat flour of the total amount required for the preparation of dough, yeast suspension and water.

After kneading, the dough was left for fermentation. The initial fermentation temperature of the dough is 25-29°C, the duration of fermentation is 180-270 minutes. The final acidity of the dough is 2.5-3.5 degrees.

RESULTS AND DISCUSSION

The dough was kneaded in a batch kneader from the total amount of fermented dough, with the addition of the remaining amount of flour, enriching herbal ingredients, saline and water.

After kneading, the dough was sent to fermentation. The initial temperature of the dough is 27 - 33°C, the duration of fermentation according to the improved technology is 55 minutes. The fermented dough was sent for cutting.

Cutting dough for wheat flour flat bread includes the following operations: dividing the dough into pieces and placing them in molds, final proofing of the dough pieces.

Measured piece of dough weighing 400 g was placed in container preliminarily greased with vegetable oil and sent to the final proofing, which, according to an improved technology, was carried out at a temperature of 36°C, a relative humidity of 75 - 78% for 40 minutes. Parted dough pieces were sent to baking.

Cakes made from wheat flour with vegetable extracts were baked in a tandoor at vapor-air temperature of 220°C for 35 minutes.

Flat breads, taken out of the tandoor, were cooled down at a temperature of 18-25 °C in a cooling unit.

CONCLUSION

Flat breads made from wheat flour with plant extracts were packed separately from each other in plastic bags. The storage and transportation of the cake was carried out in accordance with existing production standards.

The main advantages of the improved technology in comparison with the traditional one are: reduction of dough fermentation time by 39% and final proofing time by 11%, as well as obtaining finished product with high quality characteristics.

Thus, a reduction in the duration of dough fermentation and final proofing is achieved due to intensifying effect on the fermentation process of the introduced vegetable extracts. In addition, the rich chemical content of the composition of vegetable extracts allows enriching finished products with vitamins, minerals, and helps to increase the organoleptic characteristics of flat



bread made from wheat flour.

REFERENCES

1. Auerman L.Ya. *Technology of bakery production: Textbook. 9thed; revised and added.* L.Ya. Auerman; under edition of L.I. Puchkov. - SPb: Profession, 2005, p. 416.
2. Vershinina O.L. *Use of oilseeds in production of functional bakery products.* O.L. Vershinina, V.A. Mikhailov, Yu.F. Roslyakov, A.V. Shpakov, Yu.M. Semchenko. *Bulletin of universities. Food technology.* 2006. No. 2-3, p.60-61.
3. Gichev Yu.Yu. *Guidance on dietary supplements.* Yu.Yu. Gichev, Yu.P. Gichev. M: "Triada-X", 2001, p.232.
4. Kireeva L.I. *Development of technology for the preparation and use of flour composite mixtures for the baking industry.* L.I. Kireeva. *Author's abstract of dissertation of candidate of technical sciences.* M.: 1998, p.26.
5. Kolpakova V. *Enrichment of bread with protein-fat products,* V. Kolpakova, I. Martynova, S. Severinenko, T. Yudina, A. Nevsky. *Bakery products.* 2005, No.9. p.38-40.
6. *Food chemistry / ed. A.P. Nechaev. - SPb .: GIORD.* 2003, p.640.
7. Kazakov E.D. *Biochemistry of grain and products of its processing* E.D. Kazakov, V.L. Kretovich. M.: Agropromizdat, 1989, p.368.
8. Kretovich V.L. *Fundamentals of plant biochemistry.* V.L. Kretovich. M.: High school, 1971, p. 464.
9. Pleshkov B.P. *Biochemistry of agricultural plants / B.P. Pleshkov.* M.: Agropromizdat. 1987, p.302.
10. T.V. Sanina *Increasing the nutritional value of bakery products of mass consumption / T.V. Sanina, E.I. Ponomareva, O. N. Voropaeva.* *Bread-making of Russia.* 2006. No. 6, p.2
11. Tsyganova T.B. *Technology and organization of production of bakery products / T.B. Tsyganova. - M.: Publishing Center "Academy", 2006, p. 448.*
12. Shlelenko L.A. *Modern assortment of bakery products for preventive and therapeutic nutrition / L.A. Shlelenko // Bread-making of Russia.* 2004. No. 2. p.17.
13. Rogov I.A. *Food Biotechnology: Vol. 1. Basics of food biotechnology* I.A. Rogov, L.V. Antipova, G.P. Shuvaeva - M.: Kolos, 2004, p.440.
14. A.I.Glushenkova, Sh.Sh.Sagdullaev, M.B.Davlyatova, *Oil cake of sesamium* Acad.S.YU.Yunusov institute of the chemistry of plant Substances AS RUz «12thInternational Symposium on the Chemistry of Natural Compounds», September 7-8. 2017.p.202c.
15. Sh.Sh.Sagdullaev, F.I.Inoyatova, A.I.Glushenkova, M.B.Davlyatova, *Lipids of zizyphusjuba fruits* Acad.S.YU.Yunusov institute of the chemistry of plant Substances AS RUz «12thInternational Symposium on the Chemistry of Natural Compounds», September 7-8. 2017.
16. Puchkova L.I. *Laboratory tutorial on technology of bakery production. 4thed. revised and added.* L.I. Puchkov. SPb: GIORD.2004, p. 264
17. Lurie I.S. *Technology and technical-chemical control of confectionery production.* I.S. Lurie. M.: Light industry. 1981 p. 328.
18. *Formulations for Uzbek flat bread.* Tashkent, 1988, p.48.
19. *Uzbek patyrflat breads,* RST UzSSR 423-88. Tashkent, 1988, p.21