

Journal Website: http://usajournalshub.c om/index,php/tajabe

Copyright: Original content from this work may be used under the terms of the creative commons attributes 4.0 licence.

Investigation Of The Effect Of Plant Extracts On The Rheological Properties Of Wheat Dough

Davlatova Mavluda Bakhtiyarovna Doctoral Student, Bukhara Institute Of Engineering And Technology, Uzbekistan

Sagdullaev Shamansur Shakhidovich

Proffessor Doctor Technical. Sciences, Institute Of Chemistry Of Plant Substances. Acad. S. Yu. Yunusov Academy Of Sciences Of Uzbekistan, Uzbekistan

Majidov Kakhramon Khalilovich Prof. Dr. Technical Sciences, Bukhara Institute Of Engineering And Technology, Uzbekistan

Amonova Zubayda Mukimovna Candidate Technical sciences, Bukhara Institute of engineering and technology, Uzbekistan

Yuldasheva Nigora Karimovna

Ph. D. In Chemical Sciences (Phd), Institute Of Chemistry Of Plant Substances. Acad. S. Yu. Yunusov Academy Of Sciences Of Uzbekistan, Uzbekistan

ABSTRACT

It is aimed at studying the influence of certain types of plant extracts " Unabi "(zizifus) and" Karolina " (kaspiyskaya) on the rheological properties of wheat dough in the technology of making national tortillas.

Object of research here were plant extracts obtained by extraction of the aboveground part of the plants "Unabi" and "Karolina", as well as some assortment of national bakery products. Uzbek tortillas were chosen as national bakery products.

KEYWORDS

Plant extracts, processing certain plants, national bakery products

INTRODUCTION

The formation of a healthy diet based on the concept of food balance dictates the need to create products with increased nutritional value.

One of the ways to increase the nutritional value of products ,in particular bakery and confectionery products ,is the use of biologically valuable plant raw materials in technologies and recipes [1-3]. Foreign and domestic scientists have made a great contribution to the development of technologies for enriched bakery and confectionery products [4-6].

Plant extracts obtained by processing certain plants are a rich source of biological active substances [7-10]. Plant extracts, in particular, "Unabi" (zizifus) and "Karolina" (kaspiyskaya) differ in their technological and functional properties from the known and traditional types of raw materials [11-12] of bakery and confectionery production.

In this regard, scientific and practical research on the use of new types of plant extracts in food technologies is relevant.

Purpose of work

It is aimed at studying the influence of certain types of plant extracts " Unabi "(zizifus) and" Karolina " (kaspiyskaya) on the rheological properties of wheat dough in the technology of making national tortillas.

Object of research here were plant extracts obtained by extraction of the aboveground part of the plants "Unabi" and "Karolina", as well as some assortment of national bakery products. Uzbek tortillas were chosen as national bakery products [13-14]. The raw materials used met the current standards:

- wheat flour baking of the first class (GOST 52189-2003);
- pressed baking yeast (GOST 171-81);
- table salt (GOST R 51574-2000);
- Drinking water (GOST 51232-98);

METHOD OF RESEARCH

When studying the chemical composition of raw materials of plant extracts, the content of the mass fraction of moisture, protein, fat, fiber, and minerals was determined [15].

To assess the effect of plant extracts on the baking properties of wheat flour of the first grade, we determined the amount of raw gluten washed manually from wheat flour according to GOST 27839-88, its quality by its ability to resist the deforming compression load on the IDK-ZM device according to the method given in the manual [16].

The products were analyzed 24 hours after baking for physico-chemical and organoleptic parameters.

Organoleptic parameters of finished tortillas (appearance, crumb state, taste, smell) were determined in accordance with GOST 27669-88 given in [15].

The humidity of the products was determined in accordance with GOST 21094-75 by drying in the SES drying Cabinet [15].

The acidity of the finished products was determined according to GOST 5670-96 by titrating the crumb suspension with 0.1 N Na OH solution and expressed in deg.

The porosity of products was determined according to GOST 5669-96.

The specific volume of finished products and their shape stability were determined by the method in accordance with GOST 27669-88, given in [15].

Results and discussion. When studying the effect of plant extracts on the rheological properties of wheat dough, its effective viscosity was determined in accordance with the known method. The effective viscosity of wheat dough from plant extracts was determined using a rotary viscometer "Keo1ez1-KU2", which is designed to determine the dynamic viscosity of Newtonian and non-Newtonian liquids. The principle of operation of the device is to measure the torque of a rotating cylinder placed in the test mass located in a stationary cylinder. For research, test samples were prepared from a mixture of wheat flour with different contents of plant extracts (50 g of the mixture weight) and distilled water (60 ml). The studied semifinished products had a humidity of 60 %.

The device readings were taken at room temperature, at different speeds of rotation of the rotor (strain rate).

Studies were carried out in the area of effective viscosity (C), which depends on the stress (d) and shear rate (y'). The effective viscosity shows the flow of pseudoplastic objects when the initial structure is destroyed with increasing shear stress during the flow. The effective viscosity is an integral characteristic that describes the equilibrium state between the processes of restoration and destruction of the structure. The most widely used power law of flow or the Oswaldde vil equation, proposed for pseudoplastic bodies

$$r = \eta * \gamma^n, \tag{1}$$

Where n is the effective viscosity and n is the flow index.

The flow index for pseudoplastic materials is less than 1. For n=1, the power law becomes Newton's law, and ŋ becomes ŋo, i.e., the initial Newtonian viscosity.

The effective viscosity, (ŋ) and shear stress (r) were calculated using the formulas 5,6:

$$r=z\cdot\alpha, \Pi a,$$
 (2)

Where: 2 - constant of the device (g=3.0588 PA-div.scale) and-readings of the scale of the device, units. Etc.

$$\eta = r / \gamma^{\cdot} \Pi a^{\cdot} c \tag{3}$$

Where γ is the shear rate, s.

The effects of plant extracts on the properties of gluten were studied. The gluten content was judged by the amount of hand-washed gluten, its elastic qualities by the ability of gluten to resist the deforming load compression on the IDK-ZM device.

To assess the effect of plant extracts on the gluten properties of wheat flour, we used the ratio of wheat flour 1C and plant extracts: non-fat, semi-fat, skim-100: 0 (control) 97:3; 94:6; 91:9; The range of component ratios was selected based on the results of preliminary studies, which showed that above 9% gluten became very crumbly and did not form into a mass.

The results of these studies are presented in table 1. it was found that with an increase in the content of plant extracts in a mixture with wheat, the content of washed gluten decreased.

Table 1

Effect of plant extracts on the properties of gluten dough

		Content of plant extracts mixed with wheat flour 1C,								
	Control	Notfat-free			Semi-skimmed			Defatted		
		3	6	9	3	6	9	3	6	9
The content of wet	31 7	31.0	20.4	25.0	30.2	23.0	13.4	30.0	20.4	145
Elastic properties gluten, ed. PR. IDK-	J1. /		<u> </u>	23.0	50.2	23.0		50.0	20.4	14.2
ZM										

In the case of non-fat plant extracts, the reduction in its content reached 20 %; semi-fat-57 %, fat-free-54 %. The decrease in the amount of washed gluten was due to the replacement of part of the wheat flour extracts in the protein complex. There is a sharp decrease in the gluten content when adding plant extracts with a high protein content. Probably, vegetable protein, characterized by a predominant content of water-soluble fraction, which contains mainly low-molecularweight proteins to some extent, lining up in a gluten complex, contributes to greater leaching of gluten proteins. In the fat-free plant extract with the highest protein content, they are partially denatured due to heat treatment during extraction, their solubility is reduced, so there is no sharp decrease in the gluten content compared to semi-fat plant extracts.

The addition of plant extracts to wheat flour increased the elastic qualities of the gluten complex of wheat flour, which is confirmed by the indicators of the IDK-ZM device: the elasticity of gluten increased by 1.2-19.7 % for non-fat plant extract for semi-fat by 9.2-29.3 %, for fat-free by 14.2-29.0 %.

Thus, the formation of gluten proteins in wheat dough in the presence of plant extracts is influenced by their protein fractions.

The rheological properties of the test with plant extracts were studied in a rotary viscometer "RoK-KU2" in accordance with the well-known method. The content of plant extracts was 3, 6, 9 % similar to the study of gluten. The control was a dough made from wheat flour 1C. Based on experimental data, graphs were constructed describing the change in shear stress and effective viscosity at different strain rates when studying the test with a plant extract. It was found that the power trend line with a high degree of adequacy (more than 99 %) coincided with the experimental points. Consistency coefficients were established, which are a characteristic of the effective viscosity.

Figure 1 shows the change in the consistency coefficient for different contents of plant extracts in the dough. From the diagram of Fig. 1, it follows that the consistency

coefficients and, consequently, the viscosity increased when adding plant extracts, regardless of the type of flour. It was found that the effective viscosity increased with the addition of semi-skimmed and skimmed plant extracts in the amount of 6 % and 9 % by 22, 3 and 264 %, as well as 30.7 and 193%, respectively. Such an effect on the rheological properties can be exerted both by the additional introduction of protein in the composition of plant extracts, and by polysaccharides with high hydrophilicity. They can easily be poetized in water with the formation of viscous gels.



Figure 1 Effect of plant extracts on the indicator consistency coefficient

In the case of non-fat plant extracts, the increase in viscosity occurred at its content of 9 % by 38 %. This can be explained by the significant content of lipids in non-fat plant extracts, which acted as a plasticizer.

The quality of finished products with plant extracts was judged by determining the specific volume, shape stability, porosity, humidity and acidity. Finished products with the addition of non-fat semi-fat, non-fat plant extracts were obtained by conducting laboratory baking of dough samples prepared from flour, water, salt and yeast without the sponge method. Vegetable extracts were mixed with wheat flour 1C in the amount of 3, 6, 9% in the range of gluten and rheological parameters of the test.

In table. 2 presents the results of research on the influence of various types of plant extracts on the quality of finished products.

Table 2

Qualityindicator	ntrol	Content of plant extracts mixed with wheat flour I C, %									
		Non-Fat Semi-			Semi- Fat			Non-Fat			
	Co	3	6	9	3	6	9	3	6	9	
Specificvolume,	250	256	258	260	271	277	252	268	270	254	
Shapestability	0,50	0,51	0,52	0,52	0,49	0,48	0,50	0,48	0,48	0,5	
Porosity, %	70	71	72	73	74	76	71	74	74	71	
Humidity, %	44,0	44,3	44,1	44,1	44,1	44,0	44,0	44,2	44,1	44,0	
Acidity, deg	2,6	2,8	3,1	3,2	3,2	3,2	3,4	2,9	3,0	3,2	

Influence of plant extracts on the quality of national tortillas

It was found that the introduction of plant extracts had a positive effect on the quality of finished products. The specific volume of products increased when adding non-fat plant extracts by an average of 2.5-4.2 %; when adding semi-fat plant extracts, the specific volume increased by 0.8-11.3 % in the case of non-fat plant extracts, the increase was 1.78.3 %. The porosity of the product from plant extracts increased by an average of 4.8 %. When the content of semi-fat and fat-free plant extracts was 9%, a decrease in the specific volume of products was observed (table 2).

The introduction of plant extracts in the studied range contributed to an increase in the acidity of finished products, which can be explained by the presence of a significant amount of free fatty acids in plant extracts.

Organoleptic analysis showed that the tortillas with plant extracts had a sufficiently

developed porosity, elastic crumb, and a welldefined taste and aroma.

Thus, it was found that plant extracts of all types increased the specific volume of tortillas and positively affected the quality of finished products. Based on the data on changes in the specific volume, the optimal content of plant extract in a mixture with wheat was determined: for non – fat 9%, for semi-fat and low-fat 6%.

CONCLUSION

The used plant extracts increased the specific volume of tortillas and improved the quality of the finished product.

REFERENCES

- Auerman L. Ya Technology of bakery production: Textbook. 9th ed. and additional by L. Ya.Auerman; under the General ed. By L. I. Puchkova. Saint Petersburg: Profession, 2005, 416 p.
- Vershinina O. L. the Use of oilseeds in the production of functional bakery products, O. L. Vershinina, V. A. Mikhailov, Yu. F. Roslyakov, A.V. Shpakov, Yu. m. Semchenkolzv.highereducational.Food technology.-2006. - Nº2- - P. 60-61s.
- 3. Gichev Yu. y. Guide to biologically active additives. Yu. y. Gichev, Yu. P. Gichev. - M: "Triad-X", 2001. -232 p.
- Kireeva L. I. Development of technology for the preparation and application of flour composite mixtures for the baking industry L. I. Kireevaautoref. dis. Cand. tech. nauk. - M.: 1998. -26 p.
- 5..Kolpakova V. Enrichment of bread with protein and fat products, V. Kolpakova, I. Martynova, S. Severinenko, T. Yudina, A. Nevsky bread Products.-2005. - №9. - P. 38-40 p.
- **6.** Food chemistry/ edited by A. P. Nechaeva. Saint Petersburg: GIORD. 2003, 640 p.
- 7. Kazakov E. D., Biochemistry of grain and products of its processing E. D. Kazakov,
 V. L. Kretovich. - M.: Agropromizdat, 1989. -368 p.
- Kretovich V. L. Fundamentals of plant biochemistry V. L Kretovich M.: Higher school, 1971. - 464 p.
- Pleshkov B. P. Biochemistry of agricultural plants / B. P. Pleshkov. - M.: Agropromizdat. - 1987. - 302 p.
- Sanina T. V. 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

- A.I.Glushenkova, Sh.Sh.Sagdullaev, M.B.Davlyatova, Oil cake of sesamiumAcad.S.YU.Yunusov institute of the chemistry of plant Substances AS RUz «12 th International Symposium on the Chemistry of Natural Compounds», September 7-8, 2017, p.202.
- Sh.Sh.Sagdullaev, F.I.Inoyatova, A.I.Glushenkova, M.B.Davlyatova, Lipids of zizyphusjujuba fruitsAcad.S.YU.Yunusov institute of the chemistry of plant Substances AS RUz «12 th International Symposium on the Chemistry of Natural Compounds», September 7-8, 2017.
- Recipe for Uzbek flatbreads. Tashkent, 1998, 48 p.
- 14. dubtsov G. G. Production of national bread products. Agropromizdat, Moscow, 1991, 164 p.
- Puchkova L. I. Laboratory practice on the technology of bakery production. - 4th ed. and additional by L. I. Puchkov. - SPb:. GIORD.-2004. -264 with
- Lurie And.C Technology and technochemical control of confectionery production I. S. Lurie – - M:. Lightindustry. - 1981. - 328 p.