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# DETERMINATION OF THE INFLUENCE OF ROSEHIP POWDER ON THE QUALITY OF WHEAT DOUGH AND BREAD

The object of the research is the technology of wheat bread. The problem of creating high-quality bakery products using natural non-traditional raw materials with a high content of physiologically functional nutrients is solved. For this purpose, it is proposed to use rosehip powder. The introduction of non-traditional raw materials into the dough affects not only the nutritional value, but also the formation of bread quality. In this regard, the work investigated the effect of rosehip powder on the properties of wheat flour, as well as the processes of dough ripening, organoleptic and physicochemical properties of products. It was found that the introduction of rosehip powder in an amount of 2.0–8.0% to replace wheat flour contributes to the strengthening of gluten, namely, increasing elasticity and reducing gluten extensibility, reducing dough spreading, and improving the gas-holding capacity of the dough. This is explained by the oxidative action of ascorbic acid, the formation of complexes of gluten protein with polyphenols and dietary fibers of rosehip powder.

It was found that in the presence of rosehip fruit powder, lactic acid and alcoholic fermentation are activated, which contributes to more intense changes in acid accumulation and gas formation in the dough due to the activation of lactic acid bacteria and baker's yeast in the presence of biologically active substances of the additive.

The use of rosehip powder in an amount of 2.0–6.0% contributes to an increase in the specific volume, porosity and elasticity of the crumb, the formation of harmonious taste and aromatic properties of products with characteristic rosehip notes. The introduction of 8.0% of the additive is not recommended, as it leads to the formation of coarser porosity, too sharp sour taste of the additive and crunch.

The results obtained can be used in the practice of baking production to develop a technology for bread of increased nutritional value using rosehip powder.

**Keywords:** wheat bread, rosehip powder, gluten, dough ripening, quality indicators.

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## 1. Introduction

Given that bread is a product of daily use, the primary task of the bakery industry is to expand the range of products that meet modern requirements for healthy eating. In addition, recently, consumers have demonstrated a steady demand for health-promoting bakery products, which forces manufacturers to increase the production of bread with increased nutritional value using non-traditional enrichment raw materials. In this context, one of the effective directions for implementing this task is the use of natural non-traditional raw materials with a high content of physiologically functional nutrients, among which rosehip fruit processing products have high potential.

Rosehip (*Rosa L.*) is a perennial plant of the Rosaceae family, which is quite widely distributed in wild and cultivated form in significant areas of forest-steppe and mountainous areas of Ukraine. This is a shrub that is highly adaptable to soil and climatic conditions of cultivation, has a rich chemical composition and is a valuable raw material for the food, pharmaceutical and cosmetic industries. Rosehip fruits contain a significant amount of useful nutrients, namely sugars (glucose, fructose), dietary fiber (pectic substances, cellulose, hemicellulose), lipids, organic acids, phenolic compounds (flavonoids, catechins, anthocyanins, etc.), carotenoids ( $\beta$ -carotene, lycopene) and minerals (potassium, calcium, iron, magnesium, copper, zinc, etc.) [1]. Of course, rosehip can be called

the record holder for the content of ascorbic acid (vitamin C), since its amount is 10 times higher than in black currants, and also 50 times higher than in lemons. Rose hips, due to their nutritional composition, exhibit therapeutic properties, including antioxidant, immunomodulatory, anti-inflammatory and general strengthening [2, 3].

Due to their physiological, functional and technological properties, rose hips processed products are of considerable interest as raw materials for the production of bakery products with an improved nutritional profile. Since the introduction of non-traditional raw materials into the dough affects not only the nutritional value of bread, but also the course of processes that shape its quality, scientists pay significant attention to the study of these issues.

Considering that rose hips are a rich source of ascorbic acid [4], their processed products can be considered as a natural alternative to synthetic ascorbic acid. Ascorbic acid is known to be one of the most effective improvers of oxidative action, which is used in baking to improve the structure of dough and bread by strengthening gluten [5]. The authors [6, 7] proved that the addition of 0.5–2.5% rosehip pulp powder has a positive effect on the rheological properties of wheat dough, namely, it strengthens gluten, increases stability and gas-holding capacity. Also, products with rosehip powder have better taste characteristics. The authors recommend using 1.0–2.0% of the additive for bread production. The results of studies [8] also confirmed the positive effect of

2.5% rosehip pulp powder on the rheological properties of dough made from whole wheat flour, which is manifested in a significant decrease in its adhesion and extensibility. Scientists recommend using it as a natural oxidant instead of synthetic ascorbic acid.

In study [9], the antioxidant properties of wheat bread with the addition of 5.0–15.0% chestnut or pumpkin flour or defatted rosehip flour were studied. It was found that the addition of rosehip flour in bread resulted in the highest content of polyphenolic compounds and the highest antioxidant activity of bread. The greatest effect was observed in the presence of 15.0% rosehip flour. In [10], it was shown that replacing wheat flour with 5.0–15.0% defatted rosehip flour has a positive effect on the rheological properties of the dough and the quality of bread. In particular, its sensory characteristics such as crust color, taste and aroma are improved. However, it is noted that the addition of more than 5.0% rosehip flour leads to a decrease in the gluten content and an increase in the proportion of dietary fiber. This contributes to a decrease in the water absorption capacity of the dough, deterioration of its physical properties, including the specific volume of bread.

In [11], the effect of rosehip meal, which is a by-product in the technology of rosehip oil, on the ripening processes of rye-wheat dough and bread quality was studied. It was found that its addition in an amount of 2.0–4.0% of the flour mass contributes to the activation of lactic acid and alcoholic fermentation in the dough, strengthening its structure. To improve the organoleptic and physicochemical indicators of bread quality, it is recommended to add up to 4.0% of the meal. And in [12], the effectiveness of the combined use of increased nutritional value of rosehip meal together with oat or wheat germ meal in the technology of rye-wheat bread was proven to obtain high-quality products with an improved nutritional profile.

It was found that the introduction of up to 5.0% rosehip fruit oil contributes to the improvement of porosity, specific volume and dimensional stability of rye-wheat bread, which is explained by the influence of biologically active substances contained in rosehip oil on the fermentation microflora [13].

In study [14], the effect of 5–10% rosehip seed flour on the quality and nutritional value of wheat bread was studied. The authors found that to obtain products with high sensory properties and an increased content of polyunsaturated fatty acids, phenolic compounds and minerals, it is advisable to use 5.0% of the additive. Its greater amount in products leads to a deterioration in loaf volume and height, hardness, color and chewiness indicators.

In [15], the effectiveness of using rosehip aqueous and whey extracts for regulating the dough structure, quality of wheat bread and its nutritional value was experimentally proven. It is shown that their addition in the amount of 30.0% and 15.0%, respectively, leads to an improvement in the physical properties of the dough and the physicochemical properties of the bread due to the strengthening of gluten under the influence of pectin substances, polyphenols, organic acids contained in phytoextracts.

The works analyzed above investigated the effect on the properties of the dough and bread of rosehip processing products obtained from different components of the fruit. At the same time, it should be noted that the most complete chemical composition of rosehip fruits is preserved in whole-ground rosehip products. In view of this, rosehip powders obtained by grinding whole rosehip fruits attract attention. In literary sources, there is some information about their use in bread technologies. Thus, the authors [16] recommended using 2% rosehip powder in a mixture with 15% chestnut flour to increase the nutritional value and ensure the quality of wheat bread. In [17], the optimal composition of the mixture for improving the specific volume and porosity of whole grain bread was determined by mathematical modeling. The mixture includes 2.86% rosehip powder in a complex with 7.13% chia seeds and 6.9% sesame seeds. These data do not allow to draw a conclusion about the influence of whole rosehip powder on the process of

preparing wheat dough and bread quality indicators, since, on the one hand, rosehip powder was used in mixtures with other enriching raw materials, and on the other hand, a rather narrow interval of additive dosages was studied.

Thus, there is no systematic information in the literature on the influence of whole rosehip powder on the processes of bread quality formation; therefore, it is relevant to continue research in this direction.

*The object of research* is the technology of wheat bread.

*The aim of research* was to determine the effect of rosehip powder on dough ripening processes and the quality of bread made from wheat flour.

To achieve this aim, the following objectives were defined:

- 1) to determine the effect of rosehip powder on the technological properties of wheat flour;
- 2) to establish the course of microbiological processes in the dough with the addition of the experimental additive;
- 3) to assess the effect of rosehip powder on the physicochemical and organoleptic indicators of bread quality.

## 2. Materials and Methods

### 2.1. Raw materials

There were used rosehip powder (Fig. 1) (My Eco Company, Ukraine), first-grade wheat flour (Nova Pokrovka Bakery Plant, Ukraine), pressed baker's yeast (Lviv Yeast TM, Ukraine), and table salt (Sarkara TM, Ukraine).



Fig. 1. Appearance of rosehip powder

### 2.2. Methods for studying the properties of wheat flour and dough

The content of raw and dry gluten in wheat flour, its elasticity, extensibility, hydration capacity, elasticity and color were evaluated using standard research methods described in [18]. The baking properties of flour were also evaluated by the dough ball spreading index, which was determined by the change in its diameter over 180 min [19].

The state of the carbohydrate-amylase complex of wheat flour was studied by the index of flour autolytic activity "falling number" [18].

As controls, flour samples without rosehip powder were used, in experimental samples wheat flour was partially replaced with rosehip powder in the amount of 2, 4, 6 and 8%.

### 2.3. Preparation of dough and bread samples

The preparation of test dough and bread samples was carried out in a single-phase method. The dough was kneaded in a KitchenAid dough mixer (Whirlpool Corporation, USA) until a homogeneous mass was formed from first-grade wheat flour, pressed yeast in an amount of 3%, table salt – 1.5 and the calculated amount of water. The dough humidity was 44%. In the test samples, part of the wheat flour was replaced with rosehip powder in an amount of 2, 4, 6 and 8%.

After kneading, the dough was subjected to a ripening process at a temperature of  $30 \pm 2^\circ\text{C}$  for 180 min. Then the dough was divided into pieces, rounded, shaped and proofed in an XLT 133 Unox proof-

ing cabinet (UNOX, Italy) at a temperature of  $35 \pm 2^\circ\text{C}$  and a relative humidity of  $80 \pm 5\%$ . Baking of dough blanks was carried out in the XFT133 LINEMISS Unox oven (UNOX, Italy) at a temperature of  $200 \pm 20^\circ\text{C}$  with humidification of the baking chamber. The duration of bread baking was  $25 \pm 2$  min.

#### 2.4. Methods of studying dough properties

Titration acidity of dough was determined by neutralizing dough acids with 0.1 N NaOH solution in the presence of phenolphthalein indicator until the pink color does not disappear within 30 s [18]. The gas-forming ability of dough was determined by the total amount of carbon dioxide released during fermentation, according to the method given in [19].

#### 2.5. Methods of assessing bread quality

The quality of finished bread was assessed by a set of organoleptic and physicochemical quality indicators according to generally accepted methods [20]. Organoleptic evaluation was carried out taking into account such characteristics as appearance, color and condition of the surface and crumb, taste and smell.

Among the physicochemical quality indicators, the mass fraction of moisture, acidity and porosity of the crumb were determined. In addition, important technological indicators such as dimensional stability and specific volume of bread were determined. The mass fraction of moisture in the bread crumb was determined by drying the sample in a drying oven to a constant mass, the crumb acidity was determined by titrating an aqueous extract of 0.1 N NaOH in the presence of a phenolphthalein indicator. The porosity of the bread was measured using a Zhuravlev device (LLC "NVF Standart-M", Ukraine). The specific volume of bread ( $\text{cm}^3/100$  g) was calculated as the ratio of the volume of bread to its mass. The volume of products ( $\text{cm}^3$ ) was determined by measuring the volume of grain displaced by the bread from the volumetric meter. The dimensional stability of the products (mm) was determined as the ratio of the height of the hearth products to their diameter.

#### 2.6. Statistical analysis

The statistical processing of the experimental data was carried out using standard Microsoft Office software for a series of three parallel measurements. The statistical significance of the results was determined at  $p \leq 0.05$ .

### 3. Results and Discussion

#### 3.1. Determination of the effect of rosehip powder on the technological properties of wheat flour

The technological properties of wheat flour play a key role in shaping the quality of wheat dough and bread; therefore, at the first stage of research, the effect of rosehip powder on these characteristics was determined. In this series of experiments, the following characteristics of the baking properties of wheat flour were determined: the amount and quality of gluten, the number of falls, and the spreading of the dough ball.

The results of determining the change in the properties of wheat flour gluten are given in Table 1. It was found that the introduction of 2–8% of the experimental additive instead of wheat flour leads to a decrease in the content of raw gluten by 5.0–20.2%. The content of dry gluten also decreases. This is explained by the loss of proteins due to the dehydrating effect of highly hydrophilic dietary fibers, mono- and disaccharides present in rosehip powder.

Changes in the state of gluten towards an increase in its elastic properties under the influence of the additive components can be caused by a number of factors. First of all, the strengthening effect of rosehip powder is due to the presence of ascorbic acid in it, which, as

is known, in the dough under the action of the enzyme ascorbate oxidase promotes the oxidation of sulfhydryl (thiol) groups of gluten proteins with the formation of strong disulfide bonds. At the same time, thiol groups of proteolytic enzymes are also oxidized, which contributes to a decrease in their activity [5, 21, 22]. Gluten strengthening is also provided by non-starch polysaccharides of rosehip powder, which form complexes with wheat flour proteins [23]. Another important factor in gluten strengthening is the significant amount of polyphenolic compounds in rosehip powder, the interaction of which with gluten contributes to its strengthening by forming protein-polyphenol complexes, as shown in works [24–26].

Table 1

Effect of rosehip powder on the quantity and quality of gluten in wheat flour ( $p \leq 0.05$ ,  $n = 3$ ,  $\sigma = 3\text{--}5\%$ )

Indicators	Gluten samples				
	without additive (control)	with additive, % instead of flour			
		2.0	4.0	6.0	8.0
Amount of raw gluten, %	26.2	24.9	23.5	22.3	21.2
Amount of dry gluten, %	9.4	9.1	8.7	8.4	8.2
Elasticity, units	76	69	61	56	53
Extensibility, cm	16	14	13	11	10
Hydration capacity, %	178.6	173.9	169.5	163.1	156.4
Color	Cream	Light brown	Brown	Dark brown	

The interaction of gluten with rosehip powder polyphenols is also evidenced by a change in its color from light to dark brown, which is associated with the coloring properties of these substances.

Gluten strengthening by adding rosehip powder causes an increase in the elastic properties of the dough, as evidenced by a decrease in the dough ball spreading rate of the test dough samples by 7.0–16.0% compared to the control sample (Fig. 2).

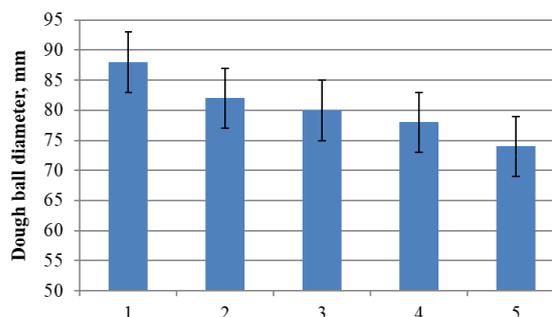


Fig. 2. Spreading of dough ball: 1 – without additive (control); 2, 3, 4, 5 – with replacement of wheat flour with 2, 4, 6, 8% rosehip powder

In the formation of dough structure and bread quality, a significant role is played by the properties of the carbohydrate-amylase complex of flour, which are determined mainly by the properties of starch and the activity of amylolytic enzymes. As the results of the experiments (Fig. 3) show, the addition of rosehip powder leads to a decrease in the falling number of wheat flour by 5.0–16.9%.

This is probably due to the fact that dietary fibers and sugars of the additive compete with starch for water, reducing the ability of grains to swell [5]. In addition, polyphenolic compounds present in rosehip powder can disrupt the initial structure of starch grains [27], and organic acids can hydrolyze starch polysaccharides.

Therefore, the presence of rosehip powder in an amount of 2–8% of the flour mass contributes to the strengthening of the elastic properties of gluten and affects the process of gelatinization of wheat starch.

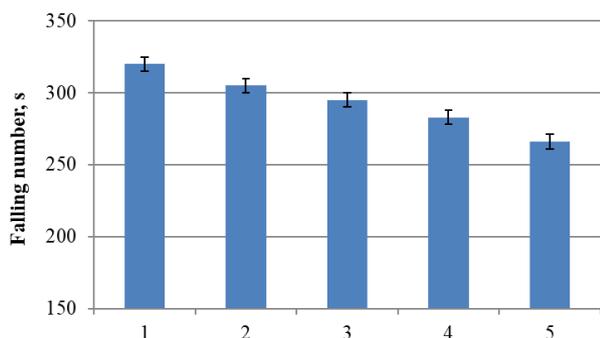


Fig. 3. Falling number of wheat flour: 1 – without additive (control); 2, 3, 4, 5 – with replacement of wheat flour with 2, 4, 6, 8% rosehip powder

### 3.2. Research of the influence of rosehip powder on the course of microbiological processes of dough ripening

It was established that the addition of rosehip powder intensifies the microbiological processes of dough ripening, which is manifested in the acceleration of acid accumulation and gas formation in it (Table 2). From the data presented, it is clear that replacing flour with 2–8% rosehip powder leads to an increase in the initial acidity of the dough by 10.7–42.1% due to the presence of organic acids in it. During ripening, the acidity changes more intensively than in the control sample, probably due to the activation of lactic acid bacteria.

Table 2

The influence of rosehip powder on the change in titrated acidity and gas formation during 180 min of wheat dough ripening ( $p \leq 0.05$ ,  $n = 3$ ,  $\sigma = 3-5\%$ )

Name of indicators	Bread without additive (control sample)	Bread with replacement of wheat flour with rosehip powder, %				
		2	4	6	8	
Titrated acidity, degrees	Initial	1.9	2.1	2.4	2.5	2.8
	Final	2.9	3.3	3.7	3.9	4.4
Total CO <sub>2</sub> amount, cm <sup>3</sup> /100 g of dough	1100	1180	1230	1280	1340	

The final acidity of the test samples compared to the control was also higher by 14.0–49.3%, respectively.

Gas formation in the dough is also intensified by the addition of the test powder. The total amount of carbon dioxide released during 180 min of ripening in the test dough samples was 7.2–21.0%, respectively, higher than in the control sample. The acceleration of lactic acid and alcoholic fermentation in the dough with the additive probably occurs due to the activation of lactic acid bacteria and baker's yeast in the presence of biologically active substances introduced into the dough together with the powder.

### 3.3. Determination of the influence of rosehip powder on the physicochemical and organoleptic indicators of bread quality

As a result of the change in the behavior of wheat flour and the intensity of microbiological processes during dough ripening with the addition of rosehip powder, the organoleptic and physicochemical properties of bread change (Tables 3, 4).

From the data presented in Table 3, it is clear that the addition of rosehip powder in an amount of 2–6% does not affect the shape and condition of the bread surface, while the surface of bread with its maximum amount is rough and bumpy.

The crust of bread changes color from light to dark brown as the additive increases.

When the additive is added in an amount of 2–6%, the elasticity of the bread improves, the porosity becomes more developed, which is associated with the improvement of the dough structure as a result of strengthening the gluten and increasing gas formation in the dough.

Also, the products have a rosehip flavor and aroma. It should be noted that when the dosage of rosehip powder is 8.0%, the porosity of the products becomes coarser, thick-walled, and the taste acquires sharp sour notes, an overly pronounced rosehip flavor. In addition, the crunch of the additive particles is felt when chewing.

The results of determining the effect of rosehip powder on the physicochemical properties of bread are shown in Table 4. It was found that due to the higher acidity of the dough with the additive, as its dosage increases, the titrated acidity of the bread increases by 12.5–62.5% relative to the control sample.

Table 3

The influence of rosehip powder on the organoleptic indicators of wheat bread quality

Name of indicators	Bread without additives (control sample)	Bread with replacement of wheat flour with rosehip powder, %			
		2	4	6	8
Shape, surface condition	Regular shape, without cracks or breaks, smooth surface	Regular shape, without cracks or breaks, smooth surface			Regular shape, without cracks or breaks, rough, bumpy surface
Crust color	Creamy	Light brown	Brown		Dark brown
Crumb condition	Elastic, thin-walled, well-developed porosity	More elastic compared to the control, thin-walled porosity, more developed			More elastic compared to the control, developed porosity, large, thick-walled
Taste	Product-specific	Product-specific with a slight rosehip flavor		Product-specific with a pronounced rosehip flavor	Sour, sharp, with too pronounced rosehip flavor, when chewing, the crunch of the additive particles is felt
Smell	Product-specific	Product-specific with a slight rosehip aroma			Typical of a product with a pronounced rosehip aroma

Table 4

The effect of rosehip powder on the physicochemical quality parameters of wheat bread ( $p \leq 0.05$ ,  $n = 3$ ,  $\sigma = 3-5\%$ )

Name of indicators	Bread without additive (control sample)	Bread with replacement of wheat flour with rosehip powder, %			
		2	4	6	8
Titrated acidity, degrees	2.4	2.7	3.1	3.4	4.0
Specific volume, cm <sup>3</sup> /100 g	300	325	342	356	336
Porosity, %	70	71	73	75	73

Bread with the additive has improved specific volume indicators, which is caused by strengthening the dough structure, improving its gas-holding capacity in combination with more intense gas formation. When adding from 2 to 6% of the additive, this indicator increases by 8.3–18.7%. At the maximum dosage, the improving effect decreases, but the specific volume of bread remains higher than that of the control sample. The same trend is observed in the change in the porosity index of bread.

So, according to the results of the evaluation of the organoleptic and physicochemical indicators of bread quality, it is recommended to use no more than 6% rosehip powder for further research. Such dosages of rosehip powder can be used to develop the recipe and technology of wheat bread with increased nutritional value in real conditions of bread baking.

The results obtained can be used in the practice of bread baking to develop the technology of bread with increased nutritional value using rosehip powder.

### 3.4. Limitations and directions of research development

The limitations of the research are that the experiments were performed in laboratory conditions using a single-phase production method and using raw materials from one manufacturer. The results obtained cannot be fully extrapolated to other flour varieties or to other technologies without additional experimental verification.

Further research will be aimed at studying the biochemical processes of ripening and structural and mechanical properties of dough with the addition of rosehip powder. Also, in the future, research on the properties of wheat dough and consumer properties of bread with the combination of rosehip powder with other enriching raw materials.

## 4. Conclusions

1. It was found that the introduction of rosehip powder in the amount of 2.0–8.0% to replace wheat flour contributes to an increase in elasticity by 9.2–30.2% and a decrease in gluten extensibility by 12.5–37.5%, and a decrease in dough spreading by 7.0–16.0%. This effect is explained by the strengthening effect of ascorbic and other organic acids, as well as the interaction of gluten proteins with polyphenols and dietary fibers contained in the additive.

2. It has been proven that in the presence of rosehip powder, acid accumulation and gas formation in the dough are accelerated due to the activation of lactic acid bacteria and baker's yeast in the presence of biologically active substances of the additive.

3. It has been shown that the use of rosehip powder in an amount of 2.0–6.0% contributes to the improvement of bread quality, in particular, an increase in its specific volume by 8.3–18.7%, porosity and elasticity of the crumb, the formation of pleasant taste and aroma of products with characteristic rosehip notes is observed. The introduction of 8.0% of the additive is not recommended, as it leads to the formation of coarser porosity, too sharp sour taste of the additive and the appearance of crunch.

### Conflict of interest

The authors declare that they have no conflict of interest in relation to this research, whether financial, personal, authorship or otherwise, that could affect the research and its results presented in this paper.

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The research was performed without financial support.

### Data availability

Manuscript has no associated data.

## Use of artificial intelligence

The authors confirm that they did not use artificial intelligence technologies when creating the current work.

## Authors' contributions

**Svitlana Oliinyk:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Supervision, Validation, Writing – original draft, Writing – review and editing; **Olga Samokhvalova:** Conceptualization, Methodology, Writing – review and editing; **Bohdan Bilash:** Data curation, Formal analysis, Investigation, Methodology, Validation, Writing – original draft, Writing – review and editing; **Olena Bolkhovitina:** Data curation, Formal analysis, Investigation, Validation, Visualization, Writing – original draft, Writing – review and editing.

## References

- Sagbas, H. I. (2023). Investigation of Fruit Quality and Biochemical Traits of Rosehip (*R. canina*) Ecotypes in the Aegean Region of Türkiye. *Horticulturae*, 9 (12), 1292. <https://doi.org/10.3390/horticulturae9121292>
- Peña, F., Valencia, S., Tereucán, G., Nahuelcura, J., Jiménez-Aspee, F., Cornejo, P., Ruiz, A. (2023). Bioactive Compounds and Antioxidant Activity in the Fruit of Rosehip (*Rosa canina* L. and *Rosa rubiginosa* L.). *Molecules*, 28 (8), 3544. <https://doi.org/10.3390/molecules28083544>
- Ionescu, A.-D., Voicu, G., Ștefan, E.-M., Constantin, G.-A., Tudor, P., Militaru, G. (2025). Physico-Chemical and Resistance Characteristics of Rosehip Seeds. *Agriculture*, 15 (14), 1539. <https://doi.org/10.3390/agriculture15141539>
- Chrubasik, C., Roufogalis, B. D., Müller-Ladner, U., Chrubasik, S. (2008). A systematic review on the *Rosa canina* effect and efficacy profiles. *Phytotherapy Research*, 22 (6), 725–733. <https://doi.org/10.1002/ptr.2400>
- Drobot, V. I. (2024). *Tekhnolohiia khlibopekarskoho vyrobnytstva*. Kyiv: Vydavnytstvo ProfKnyha, 516.
- Vartolomei, N., Turtoi, M. (2023). Effect of Rosehip Powder Addition on Dough Extensographic, Amylographic and Rheofermentographic Properties and Sensory Attributes of Bread. *Processes*, 11 (4), 1088. <https://doi.org/10.3390/pr11041088>
- Vartolomei, N., Turtoi, M. (2021). The influence of the addition of rosehip powder to wheat flour on the dough farinographic properties and bread physico-chemical characteristics. *Applied Sciences*, 11 (24), 12035. <https://doi.org/10.3390/app112412035>
- Boz, H., Murat Karaoğlu, M., Gürbüz Kotancilar, H., Emre Gerçekaslan, K. (2010). The effects of different materials as dough improvers for organic whole wheat bread. *International Journal of Food Science & Technology*, 45 (7), 1472–1477. <https://doi.org/10.1111/j.1365-2621.2010.02289.x>
- Ivanova, P., Chochkov, R., Zlateva, D., Stefanova, D. (2023). Total phenolic and flavonoid content, and antioxidant activity of wheat bread enriched with pumpkin, chestnut and rosehip flour. *Carpathian Journal of Food Science and Technology*, 15 (2), 33–41. <https://doi.org/10.34302/crpfjst/2023.15.2.4>
- Chochkov, R., Zlateva, D., Ivanova, P., Stefanova, D. (2022). Effect of rosehip flour on the properties of wheat dough and bread. *Ukrainian Food Journal*, 11 (4), 558–572. <https://doi.org/10.24263/2304-974x-2022-11-4-6>
- Oliinyk, S., Samokhvalova, O., Lapitskaya, N. (2019). The influence of meal of rose hips on the ripening and quality of rye-wheat bread. *Scientific Works of National University of Food Technologies*, 25 (6), 249–258. <https://doi.org/10.24263/2225-2924-2019-25-6-31>
- Oliinyk, S., Samokhvalova, O., Lapitska, N., Kucheruk, Z. (2020). Studying the influence of meats from wheat and oat germs, and rose hips, on the formation of quality of rye wheat dough and bread. *Eastern-European Journal of Enterprise Technologies*, 1 (11 (103)), 59–65. <https://doi.org/10.15587/1729-4061.2020.187944>
- Lapytska, H., Syza, O., Gorodyska, O., Savchenko, O., Rebenok, E. (2022). The impact of rosehip oil on quality of rye-wheat bread. *Biota. Human. Technology*, 2, 106–117. <https://doi.org/10.58407/bht.2.228>
- Gül, H., Şen, H. (2017). The influence of rosehip seed flour on bread quality. *Scientific Bulletin. Biotechnologies. F*, 21, 336–342. Available at: <http://biotechnologyjournal.usamv.ro/pdf/2017/vol2017.pdf>
- Lebedenko, T., Korkach, H., Kozhevnikova, V., Novichkova, T. (2019). Methods of regulating physical properties of dough using phytoextracts. *Food Science and Technology*, 12 (4), 52–62. <https://doi.org/10.15673/fstvt12i4.1182>
- Pop, I.-A., Dossa, S., Stoin, D., Neagu, C., Moigradean, D., Alexa, E., Poiana, M.-A. (2025). Nutritional, Rheological, and Functional Assessment in the Development of Bread Using Chestnut and Rosehip-Fortified Wheat Flour. *Foods*, 14 (19), 3343. <https://doi.org/10.3390/foods14193343>

17. Alashbayeva, L., Kenzhekhojeyev, M., Borankulova, A., Muldabekova, B., Yakiyayeva, M., Tursunbayeva, S., Dyusembaeva, Z. (2024). Enhancing the quality of wholemeal bread with chia, sesame, and rosehip: mathematical modelling and organoleptic analysis. *Potravinarstvo Slovak Journal of Food Sciences*, 18, 993–1005. <https://doi.org/10.5219/2006>
  18. Drobot, V. I. (2015). *Tekhnokhimichniy kontrol syrovyny ta khlіbobulochnykh i makaronnykh vyrobiv*. Kyiv: Kondor-Vydavnytstvo, 972.
  19. Drobot, V. I. (2006). *Laboratornyi praktykum z tekhnolohii khlіbopekarskoho i makaronnoho vyrobnytstva*. Kyiv: Tsentr navchalnoi literatury, 341.
  20. Drobot, V. I. (2019). *Dovidnyk z tekhnolohii khlіbopekarskoho vyrobnytstva. Dovidnyk*. Kyiv: ProfKnyha, 580.
  21. Oliinyk, S., Samokhvalova, O.; Gubsky, S., Stabnikova, O., Stabnikov, V., Paredes-López, O. (Eds.) (2025). Wild Edible Plants Used in Bakery Production. *Wild Edible Plants*. CRC Press, 268–293. <https://doi.org/10.1201/9781003486794-10>
  22. Elkassabany, M., Hoseney, R. C. (1980). Ascorbic acid as an oxidant in wheat flour dough. II. Rheological effects. *Cereal Chemistry*, 57 (2), 88–91. Available at: [https://www.cerealsgrains.org/publications/cc/backissues/1980/Documents/chem57\\_88.pdf](https://www.cerealsgrains.org/publications/cc/backissues/1980/Documents/chem57_88.pdf)
  23. Samokhvalova, O. V., Chernikova, Yu. O., Oliinyk, S. H., Kasabova, K. R. (2015). The effect of microbial polysaccharides on the properties of wheat flour. *Eastern-European Journal of Enterprise Technologies*, 6 (10 (77)), 11–15. <https://doi.org/10.15587/1729-4061.2015.56177>
  24. Welc-Stanowska, R., Klosok, K., Nawrocka, A. (2023). Effects of gluten-phenolic acids interaction on the gluten structure and functional properties of gluten and phenolic acids. *Journal of Cereal Science*, 111, 103682. <https://doi.org/10.1016/j.jcs.2023.103682>
  25. Krekora, M., Miś, A., Nawrocka, A. (2021). Molecular interactions between gluten network and phenolic acids studied during overmixing process with application of FT-IR spectroscopy. *Journal of Cereal Science*, 99, 103203. <https://doi.org/10.1016/j.jcs.2021.103203>
  26. Du, J., Dang, M., Khalifa, I., Du, X., Xu, Y., Li, C. (2020). Persimmon tannin changes the properties and the morphology of wheat gluten by altering the cross-linking, and the secondary structure in a dose-dependent manner. *Food Research International*, 137, 109536. <https://doi.org/10.1016/j.foodres.2020.109536>
  27. Wu, Y., Liu, Y., Jia, Y., Zhang, H., Ren, F. (2024). Formation and Application of Starch–Polyphenol Complexes: Influencing Factors and Rapid Screening Based on Chemometrics. *Foods*, 13 (10), 1557. <https://doi.org/10.3390/foods13101557>
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