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IMPROVING THE STORAGE STABILITY AND OPTIMIZING THE QUALITY INDICATORS OF MARINATED DRIED TOMATOES

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Abstract. This study investigated technological approaches to improving the storage stability and quality characteristics of marinated dried tomatoes. The research was conducted under laboratory and experimental conditions during 2025–2026. Technically mature, undamaged tomato fruits with an average mass of 70–110 g, dry matter content of 5.0–6.5%, and pH of 4.0–4.5 were used as the raw material. The effects of different concentrations of acetic acid, sodium chloride, and sugar, as well as marinating duration and drying temperature, were evaluated. Five marinating treatments were tested, followed by drying at 55, 60, 65, and 70 °C until the moisture content reached 18–22%. The results showed that the marinating composition and drying temperature substantially influenced the technological and sensory properties of the finished product. The combination of 1.5% acetic acid, 4.0% sodium chloride, and 3.0% sugar with a 45-min marinating period provided favorable product characteristics. Drying at 60–65 °C ensured relatively uniform moisture removal, preservation of product structure, and satisfactory appearance. The obtained results demonstrate that optimization of marinating and drying parameters can contribute to improving the quality and storage stability of marinated dried tomatoes.

Keywords. Marinated dried tomatoes, tomato processing, storage stability, quality indicators, drying temperature, marinating process, acetic acid, sodium chloride, sugar concentration, moisture content, food preservation, dehydration technology.

Introduction. Tomato (*Solanum lycopersicum* L.) is one of the most important vegetable crops worldwide due to its nutritional value, diverse processing possibilities, and high consumer demand. Fresh tomatoes contain considerable amounts of water, organic acids, sugars, vitamins, minerals, carotenoids, and biologically active compounds. However, their high moisture content and active metabolic processes after harvest make them highly perishable, resulting in considerable postharvest losses, particularly when appropriate storage and processing technologies are unavailable. Therefore, the development of effective methods for extending the shelf life of tomato products while maintaining their nutritional, physicochemical, sensory, and technological properties remains an important research objective. Drying is one of the oldest and most widely used methods for preserving fruits and vegetables. Reduction of water content limits microbial growth and slows enzymatic and chemical reactions, thereby increasing product stability during storage. At the same time, drying conditions have a substantial influence on the color, texture, flavor, rehydration capacity, and nutritional quality of the final product. Excessively high temperatures may accelerate undesirable browning reactions, cause surface hardening, and negatively affect heat-sensitive bioactive compounds, whereas insufficient drying temperatures may increase processing time and create unfavorable conditions for long-term storage.

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Materials and Methods. The research was conducted during 2025–2026 under laboratory and experimental conditions. Technically mature, mechanically undamaged, and disease-free tomato fruits were used as the experimental material. The average fruit mass ranged from 70 to 110 g, dry matter content from 5.0 to 6.5%, and pH from 4.0 to 4.5. For each experimental treatment, 5.0 kg of tomato raw material was used. Before processing, the tomatoes were washed under running water for 2–3 min and cut into pieces with a diameter of 5–7 mm. To ensure uniform processing, the raw material was standardized according to piece mass and geometric dimensions, with variation not exceeding 5%. Prior to marination, the prepared tomato pieces were subjected to short-term thermal treatment in water at 85 ± 2 °C for 2 min. To determine the effect of marinade composition on the quality characteristics of the product, five experimental treatments were established. The control treatment contained 1.0% acetic acid, 3.0% sodium chloride, and 2.0% sugar, with a marinating duration of 30 min. In the experimental treatments, the concentrations of acetic acid, sodium chloride, and sugar and the marinating duration were varied as follows:

Treatment	Acetic acid, %	Sodium chloride, %	Sugar, %	Marinating time, min
Control	1.0	3.0	2.0	30
Treatment 1	1.0	3.0	3.0	30
Treatment 2	1.5	3.0	3.0	45
Treatment 3	1.5	4.0	3.0	45
Treatment 4	2.0	4.0	4.0	60

The marination process was carried out at 20 ± 2 °C. The ratio of tomato raw material to marinade solution was maintained at 1:1.5. After marination, the tomato pieces were separated from the solution and allowed to drain for 10–15 min to remove excess marinade. The effect of drying temperature on the quality and technological characteristics of the marinated tomato product was evaluated at 55, 60, 65, and 70 °C. The tomato pieces were distributed in a layer 8–10 mm thick. Drying was continued until the moisture content of the product reached 18–22%. Depending on the drying temperature, the total drying duration ranged from 6 to 12 h. Product mass was measured at 60-min intervals to determine the dynamics of moisture loss and drying rate.

Results. The experimental results demonstrated that both marinade composition and drying temperature had a pronounced effect on the technological and quality characteristics of marinated dried tomatoes. Changes in the concentrations of acetic acid, sodium chloride, and sugar affected the penetration of the marinade into tomato tissues, moisture migration, taste characteristics, and the structural properties of the processed product. Among the tested treatments, the control treatment produced a product with acceptable taste and structural characteristics; however, the intensity of the sweet-and-sour flavor was relatively low. Increasing the sugar concentration from 2.0% to 3.0% in Treatment 1 improved the balance of sweetness and acidity. In Treatment 2, increasing acetic acid concentration to 1.5% and extending the marinating period to 45 min resulted in more uniform penetration of the marinade into the tomato tissue. The most favorable combination was obtained in Treatment 3, containing 1.5% acetic acid, 4.0% sodium chloride, and 3.0% sugar with a marinating duration of 45 min. Under these conditions, the tomato pieces demonstrated relatively uniform flavor formation and good structural integrity after subsequent drying. In Treatment 4, the concentrations of acetic acid and sodium chloride were increased to 2.0% and 4.0%, respectively, while the sugar concentration was increased to 4.0% and the marinating period to 60 min. Although this treatment

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accelerated the penetration of the marinade, excessive softening of the tomato tissue and a stronger acidic-salty taste were observed. The drying experiments showed that increasing the drying temperature considerably accelerated moisture removal. At 55 °C, reducing the moisture content to the target level of 18–22% required approximately 10–12 h. At 60 °C, the required drying time decreased to 8–10 h, while at 65 °C it was reduced to approximately 7–8 h. The shortest drying period, approximately 6–7 h, was observed at 70 °C.

Table 2. Effect of drying temperature on the technological characteristics of marinated dried tomatoes

Drying temperature, °C	Drying duration, h	Final moisture, %	General product characteristics
55	10–12	18–22	Slow moisture removal; good preservation of shape and color
60	8–10	18–22	Uniform drying and favorable consistency
65	7–8	18–22	Efficient drying and good structural properties
70	6–7	18–22	Rapid drying; slight darkening and excessive surface drying

The results further showed that increasing the drying temperature above 65 °C did not necessarily improve overall product quality. Although the 70 °C treatment reduced the drying period by approximately 40–45% compared with the 55 °C treatment, some pieces showed darker surface coloration and signs of excessive drying. In contrast, drying at 60–65 °C provided a more uniform reduction in moisture while maintaining the characteristic appearance and consistency of the product.

Discussion. The results of the present study demonstrate that the quality and technological stability of marinated dried tomatoes are determined by the combined effects of marinade composition and drying temperature. The observed differences among treatments indicate that optimization of the pretreatment stage is as important as the selection of an appropriate drying regime. The increase in acetic acid concentration from 1.0% to 1.5% improved the formation of the characteristic acidic taste and contributed to more effective penetration of the marinade into the tomato tissue. However, increasing the concentration to 2.0% and extending the marinating period to 60 min resulted in a more pronounced acidic taste and softening of the tissue. This suggests that excessive acid exposure may adversely affect the structural properties of tomato tissues. The results therefore indicate that the concentration of organic acid should be optimized rather than maximized. Sodium chloride and sugar also played an important role in determining the sensory and structural characteristics of the product. The increase in sugar concentration from 2.0% to 3.0% improved the balance between sweet and acidic components. At the same time, increasing sodium chloride to 4.0% contributed to the formation of a more pronounced flavor profile. The combination of 1.5% acetic acid, 4.0% sodium chloride, and 3.0% sugar provided a more balanced product than the other tested formulations. The favorable effect of this combination can be associated with the simultaneous influence of acidification and osmotic

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processes on moisture migration and tissue characteristics. **Conclusion.** The results of this study demonstrated that optimization of the marinating composition and drying conditions is essential for improving the quality and storage stability of marinated dried tomatoes. The concentration of acetic acid, sodium chloride, and sugar significantly influenced the sensory characteristics, structural properties, and moisture-removal behavior of the product. Among the investigated formulations, the combination of 1.5% acetic acid, 4.0% sodium chloride, and 3.0% sugar with a 45-min marinating period provided the most favorable overall characteristics. Drying at 60–65 °C was found to be the most suitable temperature range, ensuring effective moisture removal to 18–22% while maintaining satisfactory color, consistency, and structural integrity. The combined application of optimized marination and controlled drying can therefore be considered an effective technological approach for producing marinated dried tomatoes with improved quality and storage stability. Further research should focus on determining the microbiological safety, physicochemical changes, antioxidant stability, and sensory characteristics of the optimized product during prolonged storage.

References

1. Fellows P.J. Food Processing Technology: Principles and Practice. 4th ed. Cambridge: Woodhead Publishing, 2017.
2. Kader A.A. Postharvest Technology of Horticultural Crops. 3rd ed. Oakland: University of California, Agriculture and Natural Resources, 2002.
3. Barrett D.M., Somogyi L., Ramaswamy H. Processing Fruits: Science and Technology. 2nd ed. Boca Raton: CRC Press, 2004.
4. Rahman M.S. Handbook of Food Preservation. 2nd ed. Boca Raton: CRC Press, 2007.
5. Sagar V.R., Kumar P.S. Recent advances in drying and dehydration of fruits and vegetables: a review // Journal of Food Science and Technology. 2010. Vol. 47, No. 1. P. 15–26.
6. Doymaz İ. Air-drying characteristics of tomatoes // Journal of Food Engineering. 2007. Vol. 78, No. 4. P. 1291–1297.
7. Lewicki P.P. Design of hot air drying for better foods // Trends in Food Science & Technology. 2006. Vol. 17, No. 4. P. 153–163.
8. Ratti C. Hot air and freeze-drying of high-value foods: a review // Journal of Food Engineering. 2001. Vol. 49, No. 4. P. 311–319.
9. Shi J., Le Maguer M. Lycopene in tomatoes: chemical and physical properties affected by food processing // Critical Reviews in Food Science and Nutrition. 2000. Vol. 40, No. 1. P. 1–42.