ORGANIC TOMATO SNACKS TECHNOLOGY RESEARCH

I. Bobel [1], PhD, G. Adamczyk [1], PhD, N. Falendysh [2], PhD,A. Shulga [2], Master
[1] University of Rzeszow (Poland)
[2] National University of Food Technologies (Ukraine)

Introduction. Snack products are very popular on the global food market. But the majority of these food products are characterized by low nutritional value, high energy value, the content of harmful food additives and the unbalanced chemical composition. The latest trends in the development of food technologies are aimed at the development and introduction to the market of mainly useful products enriched with essential substances, therefore the development of organic snack products from vegetable raw materials with a balanced chemical composition is relevant. Synthetic substances and genetically modified organisms are not used to produce organic food products. Considering that tomatoes have a high nutritional value, rich in vitamins, carotenoids, flavonoids, microelements and antioxidants, the use of these vegetables is appropriate for the development of snacks with increased nutritional value [1-4].

Materials and methods. In laboratory studies, organic food raw materials were used: tomatoes, sunflower seed kernels, sesame, dried herbs of Provence (rosemary, basil, thyme, sage, peppermint, oregano, marjoram), salt. The objects of research were also finished products from these raw materials – organic tomato snacks.

The kinetics of the drying process of snacks was studied on the convective drying unit Ezidri Ultra FD-1000.

Results. The aim of the work was to study the technology of organic tomato snacks, namely the main technological process – drying.

Based on the analytical review of the literature, we came to the conclusion that the traditional frying technology is not suitable for the production of healthy organic snacks, because as a result of such harsh heat treatment, most of the heat-labile substances in the product will be destroyed and there is a risk of the formation of carcinogenic substances in the product - acrylamides. A rational analogue of frying in the production of snacks in this situation is drying.

After conducting preliminary experimental studies, it was established that the three temperature regimes - 55, 65 and 75°C are the most perspective for further research.

In the course of further experiments and calculations, the change in the mass fraction of moisture of the samples during drying was investigated and the drying curves were constructed (Fig. 1).

This gives us the opportunity to conclude how the mass fraction of moisture in the product changes during the drying process, to investigate the mechanism of moisture and mass exchange during the drying process, as well as to choose a rational technological mode of thermal processing of snacks.

According to the laboratory analysis, the mass fraction of moisture of the recipe mixture before drying is 62.6±0.1%. After trial drying and evaluation of the results, it was established that the best structural and mechanical properties are observed in the product with a mass fraction of moisture of 6.2±0.1%, moreover, at the same point, the mass fraction of moisture stopped decreasing, which indicates that the product has achieved equilibrium moisture content. Therefore, this value of the moisture content was chosen as the end of the drying process.

The obtained graph of the drying curves clearly shows the dependence of the intensity of moisture removal from the product at different temperatures.

The samples reached a mass fraction of moisture of 6.1% in 240 min at a constant drying temperature of 55°C. The small hydrolysis of carbohydrates takes place, vitamins are destroyed less at this temperature. Proteins are only partially denatured to a simpler structure that is better digested by the human body.

Drying of snacks at 75°C makes it possible to obtain a product in just 150 minutes, but long-term exposure to high temperature on essential substances causes their partial or complete destruction.

Most vitamins are actively destroyed at this temperature. Proteins are denatured to even simpler structures, and starch is pasteurized, which will negatively affect the nutritional value of the developed product.

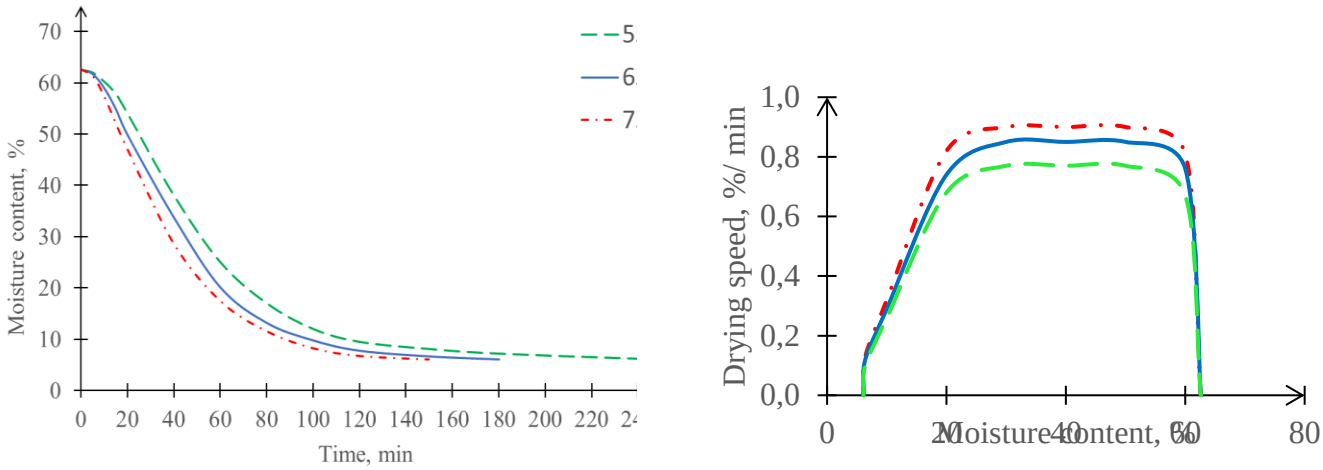

Fig. 1 – Drying curves of organic tomato snacks

This temperature regime leads to uneven external and internal diffusion of moisture, overdrying and overheating of the surface layer of the product, and the formation of cracks and crusts on its surface.

Drying snacks at a temperature of 65 °C is a compromise solution, because under such conditions, most of the essential substances remain in the product, the duration of the process is relatively short - 180 minutes, which is much more profitable than the first option for industrial production. Also, when the product is heated for 180 minutes with hot air at a temperature of 65°C, sufficient heat treatment of the product takes place, which is sufficient to destroy the vegetative forms of bacteria that could remain in the raw material. The product particles retain their volume and microporous structure, there is no cracking in the selected mode.

It was established that in the production of organic tomato snacks by convective method at a temperature of 55°C, the maximum speed of the drying process is 0.77%/min.; 65°C - 0.85 %/min.; 75°C - 0.90%/ min.

Further scientific studies of the technology of organic tomato snacks, their chemical composition and nutritional value also confirmed the feasibility of using a temperature of 65°C.

Conclusion. Based on the results of the research, it can be concluded that the rational technological mode of production of organic tomato snacks is convective drying at 65°C for 180 minutes.Under these conditions, the fulfilment of all the tasks is achieved, namely:

- the product remains a source of nutrients;
- microbiological indicators of snacks are provided under the conditions of compliance with all sanitary and epidemiological norms during production, drying, cooling and packaging of the product;
- reduced drying time compared to lower temperature regimes is an important economic indicator for the profitability and capacity of the enterprise.

References

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