

THE USAGE OF TEMPERATURES BELOW ZERO TO DEHYDRATE THE RAW BERRIES

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Introduction. The scientific innovation of this work was based on the usage of temperatures below zero (by Celsius) to dehydrate the raw berries. The authors present the results concerning the choice of wild grown plant raw (particularly berries) to create the high-vitamin compositions of fresh frozen products.

Materials and methods. With a help of standard research methods, we defined the concentration of ascorbic acid, polyphenol substances, pectin substances, organic acids and sugars in five sorts of berries (raspberries, cranberries, blueberries, black currant, and lingonberries). The analysis of qualitative and quantitative indices found in processes raw materials allowed us to recommend the researched species of berries to produce the fresh frozen products [1, 3].

Results and discussion. Now the low-temperature technology is the only one that makes possible to keep the whole natural biologically-active complex of all of the necessary substances undamaged. Talking about Ukraine, the usage of cryogenous technologies in food industry has just begun developing. That is why each way of work in such a trend fills the knowledge sum about the special features of freezing plant materials.

The objectives of this work are to elucidate the mechanism of ice behavior during freezing berries. Studying the process of water crystallization in any systems by differential scanning calorimetric method (DSC) has given a large amount of information about not only the state of water within cells and intercellular space, but also the researched object.

Setting up the optimal conditions for berries' freezing, based on the studies of the main processes (overcooling, crystallization's start and finish, intensive crystallization), was visually embodied in differential-and-thermal analytic thermograms containing the data obtained for all of the berries listed above. This process might be characterized with several sharp leaps that corresponded to the certain phase transitions' temperatures: *overcooling* period that went on within the temperature range of 283...272 K; *crystallization start* within the temperature range of

272...271 K; *intensive crystallization* zone within the temperature range of 271...269 K; *subsequent crystallization* within the temperature range of 269...265 K; *crystallization finish* [2].

Therefore, the temperature of water freezing may be examined as the maximal temperature of water's transition to solid phase. The achievement of such an index is a necessary and sufficient condition for plant raw freezing. The low freezing point for water with prevailing constrained fraction is connected to its ability to concentrate the great amount of soluble substances (including ions). As a result, the high-viscose protein and mineral mixture gets formed within localized protein components of cytoplasm and membrane structures of a cell.

Conclusions. According to the analysis of experimental data, we confirmed the conclusions made by other researchers in order to affirm the ability of wild berries to synthesize and accumulate the concentrations of essential biologically active substances higher than in their cultivated analogues. Finally, the introduction of wild grown fruit and berries wide-spread in Ukraine into the sphere of food technologies is proved scientifically and expedient economically.

The experimental data show that wild growing berries are very rich source of a complex of biologically active substances, which would allow obtaining the new foodstuff with increased biological value. Taking berries for a base to create the biologically active additives and polyfunctional ingredients is grounded scientifically, expedient technologically, and profitable economically; henceforth, the expected products from berries would have a great demand on both domestic and foreign markets.

References

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