

**СЕКЦІЯ 2. УДОСКОНАЛЕННЯ ПРОЦЕСІВ І ТЕХНОЛОГІЙ  
ВИРОБНИЦТВА ХАРЧОВОЇ ПРОДУКЦІЇ ТА ПЕРЕРОБКИ  
СІЛЬСЬКОГОСПОДАРСЬКОЇ СИРОВИНИ****AN INNOVATIVE APPROACH FOR STORING BERRIES IN THE  
MODERN**

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Storage of raw materials of plant origin is based on the maintenance of vital functions: fruits and berries separated from the mother plant are living organisms and continue to live throughout the storage period.

During storage in fruits and berries various biochemical processes which cause losses of valuable nutrients, and which change their quality proceed.

The main respiratory substrates are carbohydrates, fats and proteins. About 1/3 of the amount of carbohydrates in the tissues is consumed during respiration.

Freezing is one of the most promising methods of canning. In frozen products better than in canned in any other way, the main components that determine the nutritional value are preserved. According to organoleptic indicators - taste, aroma, color, appearance of frozen products are little different from fresh. The most effective is the use of canning by freezing for processing fruits and vegetables. The most effective fast freezing at a temperature of (- 30 °C) and below [1,2,4].

Some chemical changes take place in frozen fruits: sucrose is inverted, acidity increases slightly, the amount of tannins decreases. However, these changes do not lead to any significant deterioration in product quality. On the contrary, in some cases a more harmonious combination of nutrients is achieved than in raw materials before freezing, tartness decreases, the natural aroma of fruits is better manifested. However, these changes do not lead to any significant deterioration in product quality. On the contrary, in some cases a more harmonious combination of nutrients is achieved than was in the raw material before freezing, tartness is reduced, the natural aroma of fruits and berries is better [2,3,5].

As for fluidization, it is a process in which the flow of air in a layer of bulk products on a horizontal sieve is directed at a rate that causes the phenomenon of "boiling", when the product by its properties behaves like a liquid. If, for example, an additional dose of product is applied to the fluidization trough, its level is leveled over the entire surface. There are a number of other analogues, for example, the pressure of the layer on the bottom of the gutter is approximately equal to the height of the layer multiplied by the density. The density of the layer, as well as its stickiness decreases with increasing air flow rate, and the speed is a parameter similar

to the temperature of the liquid. The analogy is observed when the two phases with different densities or particle sizes. In the outer layer, as in the liquid, light particles with lower density or smaller size are placed at the top of the layer, and larger (heavier) at the bottom.

It is generally believed that the process of fluidization freezing, similar to drying in a suspended state, is characterized by very intensive heat transfer. In comparison with traditional methods (freezing in tunnels with forced air circulation) there is a 30-40-fold increase in the intensity of heat exchange. This is mainly due to two reasons: an increase in the heat transfer coefficient and an increase in the active heat transfer surface. Significantly increasing the heat transfer coefficient and the active heat transfer surface, reduce the active temperature difference. This increases the economic performance of the equipment.

The production line of crumbly strawberries when using the fluidization-conveyor tunnel is simple in design and has a high level of production. Raw materials come from plantations with separate peduncles. The nutritional and biological value of fruits and berries is due to the high content of vitamins, carbohydrates, pectin and minerals needed by humans. Fresh sales limit the timing and area of their consumption. Cold canning allows the preservation of up to 60% of biologically active components, while the established method of pasteurization and sterilization, their level is 10-15% of the content in fresh fruit.

The use of quick-frozen fruits and berries will allow to expand the range, improve the quality and increase the production of products not only for mass, but also for children, as well as dietary purposes. By any method and speed of freezing in the cells of berries [6, 7, 8].

The optimum temperature for freezing berries is ( $-18$  degrees and below). This is the boundary at which harmful bacteria die. To ensure that the products do not spoil, make sure that there are no differences in temperature [9, 10].

The advantages of shock freezing include:

- speed of cooling and freezing of the product without overloading the processor;
- preservation of visual and taste properties of berries;
- savings of up to 7% by weight of the finished product due to minimal weight loss during cooling;
- prevention of the development of microorganisms dangerous to health;
- significant increase in storage time of refrigerated products;
- preservation of all useful substances in products.

Thus, rapid freezing makes it possible to preserve the original taste of the product and its appearance. In the process of freezing, water molecules form crystals. During normal freezing, macrocrystals are formed, which destroy the cellular structure of the product, which has a bad effect on its organoleptic qualities. Due to the fact that the process of shock freezing occurs quickly, water molecules form microcrystals and the product retains its taste and aroma.

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