
RECYCLE FRUITS AND VEGETABLES TECHNOLOGICAL METHODS.

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Annotation.

Fruit processing methods are aimed at stopping biological and physiological processes in them, completely eliminating phytopathogenic microbes, and disconnecting products from the external environment. Fruits are mainly processed by physical, microbiological and chemical methods.

Key words.

Product, processing, sorting, calibration, thermosterilization, pasteurization, blanching, conveyor, protopectin, enzymes.

The chemical composition, sugar content, and vitamin content of the high-quality fruits grown in our republic are much higher than the fruits and vegetables grown in the northern regions. Fruits are important for the human body. The abundance of easily digestible sugars, organic acids, vitamins and minerals in their composition indicates how important they are.

Fruits are perishable products. Therefore, their timely processing makes it possible to meet the demand of consumers for these products throughout the year. The scientific justification of fruit processing is based on the natural resources and climatic conditions of each region. The widespread introduction of scientific and practical methods of fruit processing to farms will significantly reduce the amount of losses during the processing of cultivated products and help to increase the efficiency of processing enterprises. The main goal of processing is to preserve all the components useful for the human body as much as possible without reducing the quality of fruits [1-5]. Depending on the methods of fruit processing, a number of additives such as salt, sugar, spices, acid, vinegar, etc., are added in recommended quantities. These additives significantly increase their calorie content, taste and aroma, while preserving vitamins and other physiologically active substances contained in fruits.

Fruit processing methods are aimed at stopping biological and physiological processes in them, completely eliminating phytopathogenic microbes, and disconnecting products from the external environment. Fruits are mainly processed by physical, microbiological and chemical methods. There should be special processing enterprises, workshops, points and canneries necessary for fruit processing, these enterprises should be provided with the necessary equipment, drugs, chemicals, etc. Depending on the types of fruit processing, various food products are produced by heat, thermosterilization, drying, freezing, and light processing. Factors affecting fruit processing determine the quality of the product made from them. It is necessary to pay attention to a number of factors in technological processes. In order for the processed product to be of high quality, it is necessary first of all for the purity, ripeness, and color of the raw food. Before processing raw materials, sorting (separation of raw materials according to quality) and calibration (separation of raw materials according to size) are carried out. Processing of sorted raw materials is much easier. Special tables or belt conveyors are used for sorting raw materials. The movement of belt conveyors should not exceed 0.1-0.5 m/sec. In this case, the raw material is placed in a row on the tape.

Their variety is important in fruit processing. For processing, it is necessary to use only products of the recommended varieties. Otherwise, the quality of the finished product will decrease significantly. In preparation for fruit processing, the products prepared from them go through various technological stages depending on the type. Regardless of what kind of product is produced in the processing enterprises, first of all, the raw materials are weighed before the factory and subjected to laboratory tests, the purpose of which is to determine the chemical composition of the raw materials brought to processing and the various additives contained in them (various herbs plant residues, leaves, branches, soil residues on the surface of fruits, etc.) is determined and the next technological stage is the washing process. is washed with circulating water and then cleaned of additional impurities in the raw material and washed with clean drinking water before processing. In the process of washing, washing machines of different designs are used, and they are selected depending on the hardness and softness of the product. At the next stage, the raw materials are subjected to the inspection process, the purpose of the inspection process is to separate the raw materials according to their quality, and to clean the raw materials from mechanical and microbiological damage, the remains of plants and other objects added to the composition from orchards. The inspection process is mainly performed manually on belt conveyors.

At the last stage, it is performed depending on the type of products, the process in which is called the calibration process, its main purpose is to separate the raw materials according to their size, and the calibration is carried out when the raw materials are required to be the same size in the preparation of the products. For example, when pickling tomatoes and cucumbers. The calibration process is carried out in calibrator equipment. Then, the products are thoroughly washed in clean drinking water before being processed. In this case, 0.7 liters of water should be used to wash 1 kg of raw materials [6-10]. Various washing machines are used for cleaning raw materials. When preparing raw materials for processing, it is important to divide them into pieces. It uses chemical, thermal and mechanical methods.

The covering tissues of fruits contain a lot of protopectin. Therefore, in the chemical separation of vegetables and fruits from these tissues, alkaline substances that break down the protopectin substance are used. For example, if peaches are boiled in 3% alkali, and carrots are peeled in 3-6% alkali for 30-60 seconds. Fruits are separated from the skin by the thermal method and put in boiling water. Often, when peeling tomatoes, they are dipped in boiling water for 1-2 minutes or steamed for 10-20 seconds. Hot water only heats the skin of fruits and vegetables and breaks down the protopectin substance in it. As a result, the skin of vegetables and fruits is quickly separated from the fleshy part. Blanching is the treatment of fruits with boiling water or steam for a short time in preparation for processing. This term is derived from the French word meaning to whiten. In the process of blanching, enzymes involved in oxidation (peroxidase and catalase) are broken down. At the same time, the composition and amount of additives changes dramatically. It is known that when the additives are oxidized in the air, they turn into a dark color called flobafen. As a result of blanching, the enzymes that cause the oxidation of additives are destroyed, and their color does not change when the raw materials are dried. During blanching, the number of microbes is drastically reduced. The amount of oxygen in raw tissues is partially reduced, as a result, the amount of easily oxidizable vitamins does not change much. As a result of blanching, some of the additives combine with protein compounds and form water-soluble compounds, thus reducing the raw material's purity. In general, after blanching, the taste and aroma of many vegetables and fruits increases. However, the amount of dry matter in raw materials, especially carbohydrates and other water-soluble substances, decreases sharply. In this case, up to 20% loss is observed when boiling water is used, and up to 5% when steam is used. Therefore, steam

blanching is more convenient. Blanching time and temperature are different for different fruits. For example, thin-skinned fruits (plums, cherries, etc.) are blanched at 80 °C, and thick-skinned fruits (pomegranates, apples, pears, etc.) at 80-95 °C. Canneries have special blanching continuous units [11-13].

When preparing fruits for processing, it is important to cut them into pieces. Shearing is done on shearing devices with different blades. Fruits are cut in different shapes. Pomegranates and apples are circular or divided into several parts from the middle, and root vegetables are square, noodles, and circular, and most fruits are divided into two parts from the middle. One of the most widely used methods of fruit processing is canning using thermosterilization. This method is mainly based on stopping the life activity of microbes and physiological and biochemical processes in products with the help of high temperature. A number of changes occur in products under the influence of high temperature. The amount of water in the cell decreases, the activity of enzymes decreases. This, in turn, leads to a change in the chemical composition of the product. As a result of oxidation, hydrolytic and a number of other changes, the color, taste and aroma of the product change. Under the influence of heat, disaccharides are hydrolyzed into monosaccharides. Pectin substances and complex substances containing phenol are also decomposed. Vitamin C is oxidized by oxygen and decreases to 25-30% in vegetables and fruits. At the same time, there are changes in the composition of a number of complex substances that determine the taste and aroma of fruits.

When preserving fruits using thermosterilization, it is necessary to prevent the reduction of vitamins and other useful substances in their content. The technology of fruit processing in currently used equipment and devices is based on a sharp reduction in the loss of vitamins and other beneficial compounds. In this case, the tools should be made of stainless steel and the products should be well isolated from oxygen during the canning process. Processing vegetables and fruits using high heat has a negative effect on the development of microorganisms in them. A temperature increase of 100 °C kills most microbes, but heat-resistant bacteria can withstand temperatures up to 120 °C. Heat-resistant bacteria are especially common in vegetables containing a lot of nitrogenous substances. The heating temperature in thermosterilization is closely related to the type of product and its acidity (pH). At the same time, attention is also paid to the characteristics of existing microorganisms. Vegetables and fruits with a bitter taste of cell juice are sterilized at a temperature of 85-90 °C, and those without a bitter taste are sterilized at a temperature above 100 °C. Preserving fruits by heating them at a temperature

below 100 oC is called pasteurization. This method was proposed by the French microbiologist L. Pasteur. Pasteurization is carried out in a special device, a pasteurizer. In canneries, the device used to carry out the thermosterilization process at high pressure is carried out in autoclaves. In addition to sterilizing the product under the influence of high pressure and temperature in autoclaves, it can be cooked or condensed. Depending on the type of product, the autoclave is used at different pressures and temperatures. The autoclave is a tightly closed steel cylinder, the inner surface of which is covered with enamel [14-18]. A circular steam jacket is installed inside the cylinder. The autoclave is equipped with a manometer, thermometer and clock. In the autoclave, the temperature and pressure are raised and automatically controlled according to the sterilization formula. During pasteurization, the jars with raw materials are closed without lids or with iron caps and placed in boiling (50-60oC) water in the bath, the volume of water in the bath should be approximately equal to the volume of the jars. To prevent the glass jar from cracking during boiling, a piece of cloth or plywood is placed at the bottom of the bath. The water in the bath with the jars is boiled. Sterilization time is determined after the water boils. Different fruits and vegetables have different sterilization times (i.e. holding at boiling water temperature). During sterilization, the water should not boil strongly, otherwise water may splash into the jar. When the sterilization time is over, the cans are removed from the bath using special clamps and the mouth is tightly closed. Tightly closed cans are placed on the table with the mouth down to cool. One of the types of thermosterilization is to pour boiling juice into prepared sterile jars.

The following can be concluded from the above information;

- for the processed product to be of high quality, first of all, it is necessary to pay attention to the purity, ripeness, and color of the raw food.
- methods of fruit processing should be aimed at stopping biological and physiological processes in them, completely eliminating phytopathogenic microbes, and disconnecting products from the external environment.
- a number of changes occur in products under the influence of high temperature. The amount of water in the cell decreases, the activity of enzymes decreases. This, in turn, leads to a change in the chemical composition of the product.
- currently, the technology of fruit and vegetable processing is based on a sharp reduction in the loss of vitamins and other useful compounds.

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