

DEVELOPMENT OF ENERGY SAVING EQUIPMENT FOR CLEANING BASED CULTURES

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Pumpkin, due to its ability to be stored for a long time without special conditions, is a valuable raw material for vegetable processing shops that can reduce the peak seasonal load that is characteristic of these types of businesses.

At present, the technology of removing peanuts from melons is based on the use of manual labor, and the existing design solutions for cleaning the fruits from the skin are not provided during the processing of melon of the required quality.

The value of melons, especially pumpkin fruits, is very high and is due to the content of the most important elements of their nutrition. The variety of vitamins contained in the pumpkin allows it to be used as a prophylactic and therapeutic agent for various diseases. Pumpkin pulp can be widely used for concentrate of juice, jam, jam, candied fruit, production of sublimated powder, baby food, mashed potatoes, cereals, pastes, and the skin after drying can be used to produce pectin. Such a wide range of use of pumpkin as an object of processing indicates its value, both in terms of culinary capabilities and in terms of processing by vegetable processing enterprises as an object with a high degree of profitability. The interest is due to the fact that absolutely all parts of this vegetable culture are processed into different types of demanded products.

To determine the optimal parameters of the combined method of cleaning peanut pumpkin fruits, based on a combination of simultaneous steam treatment and cutting of the layer of the skin with cutting faces of the cleaning elements, the primary task was to determine the dependence of the duration of steaming and temperature on the effectiveness of cutting off the cutting edge of the brush elements of the pumpkin skin. The determinant for quality assessment was the measure of cutting effort chosen to allow an objective assessment of the effect of parameters on the efficiency of the process. The triangular shape of the section of the brush element as an element with a minimum number of cutting faces and relatively simple to

fabricate was chosen first to assess the influence of temperature and duration. Brush elements with a rounded cross-sectional shape of the elements were not considered, since the previous stages of the research showed the inexpedient use. As a subject of research, the fruits of pumpkin Muscat variety were selected as a grade having one of the maximum content of sugars and carotene, and also suitable for mechanical processing.

The studies were conducted for three seasonal storage periods of pumpkin – September, November, January, since over time the skin gets more density and elasticity. Steaming of the experimental fruit was carried out at temperatures of 100, 105, 110 °C during periods of steaming 5, 10, 15, 20, 25 minutes. The temperature regime was chosen considering the fact that the design of the proposed apparatus does not involve the implementation of a hermetic working chamber that can operate under pressure. In addition, the task was to reduce the energy costs of the purification process.

The results of the conducted researches) showed that within one time interval (September), an increase in the duration of steaming from 7–9 to 11–13 min and the temperature of 105–107 °C has a positive effect on the reduction of the cutting force of the peel, in which the skin crumbles and becomes loose, which allows to reduce the effort to separate the skin from 24.5 to 4.7·10² N/m. According to such indicators, steaming was observed at a distance of 3–5 mm that completely meets the technological requirements and minimizes the loss of raw materials. It should be noted that the increase in temperature and the duration of steaming in the future reduce the cutting effort to the minimum values, but contribute to greater raw material consumption and clogging brush cleaners produced by mass. Therefore, increasing the duration of steaming is not feasible.

The studies of the purification process for other periods of storage in November and January showed similar dynamics results, but it should be noted that the storage duration greatly affects the cutting effort and grows by an average of 30–38%, and the duration of steaming increases to 17–21 min. Such indicators indicate that the storage period increases the cost of steam by 70–80%. In order to minimize the costs of splitting the skin for the results obtained, a promising direction is conducting further research with the use of cleansing elements with another form of the cutting edge.