СЕКЦІЯ 7: СІЛЬСЬКОГОСПОДАРСЬКІ НАУКИ ТА ТЕХНОЛОГІЇ

SECTION 7: AGRICULTURAL SCIENCE AND TECHNOLOGY

APPLICATION OF THE ADVANCED DESIGN OF THE SEED SEPARATOR OF VEGETABLE AND MELON CROPS AS PART OF THE TECHNOLOGICAL LINE

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The creation of modern seed-separating machines and flow lines that meet the requirements of modern production and belong to complex technical systems requires conducting scientific research on the interaction of working bodies with the technological mass of fruits, the laws of technological processes. The purpose of this investigation is to perform the application of the advanced design of the seed separator of vegetable and melon crops as part of the technological line. It is proposed to use a two-screen system as a separating device for extracting seeds of vegetable crops, in which large particles of bark will come from the first sieve, and seeds from the second; pulp; the pulp and juice will be the by-product of the second sieve. This technological line can be considered basic, and the equipment configuration may vary depending on the needs of manufacturers.

Keywords: *seed separator, vegetable and melon crops, technological line, advanced design, agriculture.*

The natural and climatic conditions of the south of Ukraine make it possible to provide the country with vegetable crops of its own production and to create a raw material base for the processing industry in this direction. In the specialized farms for the production of seeds of vegetable crops that existed in Ukraine, technological lines were equipped with machines and equipment taking into account the culture (watermelon, melon, cucumber, tomatoes) whose seeds were obtained. Currently, such technological complexes are practically not used, and for obtaining seeds, farms get separate machines for seed selection, or complete small technological lines (depending on the capabilities of the farm). The use of such machines in labor-intensive seed production processes leads to large losses, and the efficiency of seed selection is low. This situation is due to the lack of theoretical and experimental processes for the selection and finishing of seeds of vegetable and fruit crops, which has an impact on the development of machines and technological lines. Thus, the creation of modern seed-separating machines and flow lines that meet the

requirements of modern production and belong to complex technical systems requires conducting scientific research on the interaction of working bodies with the technological mass, the laws of technological processes. Such studies will make it possible to substantiate the principles of action, structural parameters and kinematic modes of machines and their working bodies. Taking this into account, the conduct of such research is relevant and has important national economic significance.

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It is proposed to use a two-screen system as a separating device for extracting seeds of vegetable crops, in which large particles of bark will come from the first sieve, and seeds from the second; pulp; the pulp and juice will be the by-product of the second sieve. As the analysis of the work of the existing separators showed, the main losses of seeds occur in the output of the «big crust». It is a seed that is not separated from the finely ground seed particles. In order to intensify the process of additional extraction related to the seed crust, the mode of operation of the inertial separator was adopted. When the separated mass slides over the surface of the sieve, it will rub against the edges of the holes and, as a result, the content of seeds associated with the crust will decrease [1]. Separation of seeds is carried out on the second sieve. At the same time, the seeds are an above-ground product, and the pulp, pulp, and juice are under-ground products. To intensify the process of the passage of the pulp and pulp through the holes of the sieve, it is suggested to use the mode of the vibrating conveyor. In this version, at certain stages, an additional force will act on the pulp and pulp particles, and the total force of normal pressure will be equal to the sum of the force of normal pressure from the force of gravity and the force of inertia. It should also be taken into account that when separating the seeds of melon crops, the ratio of the seed-admixture ratio is equal to 1: 9 [2].

The following assumptions were made during the theoretical analysis:

• the separated material moves as a flat particle, the coefficient of resistance to movement does not depend on the thickness of the layer moved along the sieve;

• air resistance, when a particle is detached from the surface of the sieve, does not affect the law of movement of elements of the separated mass;

• the resistance to the movement of both the pulp and the peel, as well as the seeds, is characterized by the coefficient of specific resistance, which is numerically equal to the coefficient of friction of freshly isolated seeds, the sticking of particles of the separated mass is not taken into account;

• during the movement of the seeds, it is possible to hit non-elastic products (the fall is carried out on the layer of pulp and crust); as well as elastic shock (falling of seeds on the surface of the sieve);

• the recovery factor of the pulp and crust upon impact is neglected;

• we neglect the change in the angle of addition of forced oscillations to the sieve during the rotation of the crank.

Experimental studies carried out in laboratory conditions substantiated the main structural and kinematic parameters of the melon seed separator, in which the quality indicators of the technological process (seed purity, seed injury and seed loss) have optimal values. However, a real pile of seeds differs from products processed in a laboratory. It additionally contains soil particles, small stones, plant remains. In order to substantiate the possibility of using the proposed design of the separator as part of the technological equipment for the selection, washing and drying of seeds of melon crops, tests were conducted [3].

A specialized LSB-20 or LSB-30 technological line can be used to separate cucumber seeds, clean them from impurities, and dry them. This technological line can be considered basic, and the equipment configuration may vary depending on the needs of manufacturers and product processors. Harvesting of such melon crops as watermelon, cantaloupe, and pumpkin is also carried out in one continuous method. Before the start of harvesting, the fruits are rolled with a UPV-8 stacker-roller. The seeds of melon crops are collected from the swath with a pick-up machine PBV-1. The pick-up consists of a frame resting on running wheels, on which a mesh drum with a fruit cutter and an unloading cellular conveyor are installed. Moving along the swath, the harvester unloads the seeds into the cellular drum, which moves them to the unloading conveyor, which ensures the transshipment of the products into the vehicle.

To conclude, according to the results of laboratory experiments, two samples of the screen separator were refined and tests were carried out both of the experimental samples themselves and of the separators as part of the seed production lines. At the same time, productivity was: when working on a cucumber, 8.4 t/h for serial equipment and 9.8 t/h for experimental equipment. When working on watermelon, the productivity values are 21.24 t/h and 27.2 t/h, respectively [4]. During the tests, the expediency of using cam grinding rollers and additional hydraulic cleaning of the seed heap was confirmed. At the same time, it was established that the seeds of the "Vognyk" variety of watermelon are the most suitable for seed processing, and the least - the cucumber of the «Competitor» variety. However, for all processed crops, the purity of seeds after hydroseparation is not lower than 95%, with injury not exceeding 5%. Seed purity is 82.9% for watermelon and 78.3% for cucumber. The content of impurities in the final product is 3.7% and 2.3%, respectively.

R e f e r e n c e s

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DEVELOPMENT OF AN INSTALLATION FOR THE ANALYSIS OF THE PROCESS OF ELECTROPLASMOLYSIS OF PLANT RAW MATERIALS

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Fruit and vegetable raw materials are a very important and valuable basis for obtaining healthy food products. Fruits and vegetables, being sources of easily digestible carbohydrates, vitamins, dietary fibers and natural antioxidants, contribute to the regulation of the most important physiological functions of the body. Therefore, fruit and vegetable processing technologies should be focused on the rational use of raw materials with maximum preservation of physiologically valuable components of raw materials and an increase in the warranty period of storage of finished products.

Keywords: *raw plant, laboratory equipment, cell, electroplasmolysis.*

Relevance of research. Fruit and vegetable raw materials are a very important and valuable basis for obtaining healthy food products. Fruits and vegetables, being sources of easily digestible carbohydrates, vitamins, dietary fibers and natural antioxidants, contribute to the regulation of the most important physiological functions of the body. Therefore, fruit and vegetable processing technologies should be focused on the rational use of raw materials with maximum preservation of physiologically valuable components of raw materials and an increase in the warranty period of storage of finished products**.**

From the point of view of the safety of the obtained products, processing technologies using non-reactive physical influences have advantages. The use of various electrophysical effects allows you to significantly intensify technological processes, and sometimes to obtain results that are not achievable with traditional processing.