APPLICATION OF HIGH VOLTAGE DISCHARGES TO PRODUCT TREATMENT

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Introduction and Background

Up to now, multiple research studies have been carried out aimed at improving the technologies for processing agricultural products, by researchers both nationally and internationally, however, the problems characteristic of these processing processes have not been definitively solved, especially those related to reducing energy consumption, increasing the reliability of the equipment and reducing costs. In order to solve these problems and to examine the peculiarities of applying high-voltage discharges to the processing of agricultural products, research was conducted to dimension and develop an experimental installation for the production and use of these discharges, on the basis of which experimental investigations were carried out, allowing the advantages of the proposed technology compared to existing ones to be evaluated.

Methodology

When solving the problems formulated for the research, the following methods were used: experimental methods; statistical analysis and processing of experimental data; mathematical modeling; and calculation techniques using specialized software such as "Microsoft Excel" and "StatGraphics".

Results

The research has shown that the effects of high-voltage discharges occur uniformly throughout the mass of the product in the processing chamber of the installation, causing compression, deformation, or crushing effects. Moreover, electrical discharges have a pronounced antibacterial effect, manifested by the destruction of microorganisms throughout the entire mass of the treated product. Due to these effects, the proposed technology can be used both in the food industry and in agriculture, for example: for the treatment and sterilization of liquid products (milk, vegetable and fruit juices, etc.); extraction of oils from oilseed crops; extraction of juices from grapes, fruits, and vegetables; extraction of various emulsions from stems, roots, and leaves of agricultural plants with therapeutic effects, subsequently used in the food industry, traditional medicine, or cosmetics; disinfection of agricultural waste and wastewater, etc. Unlike other processing technologies, the proposed technology requires the application of a facility that is structurally simple, has low cost and low electricity consumption, exhibits high reliability under aggressive operating conditions, is easy to use, and can be widely applied to the treatment of various products.

Conclusions and Implications

The results obtained made it possible to establish the specific characteristics of treating different products using high-voltage discharges. The advantages of applying the proposed technology were identified, including reduced electricity consumption, constructive simplicity of the installation, and increased operational reliability.

Keywords: *agricultural products, electrohydraulic effect, energy consumption, high voltage discharges, processing technologies*

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