

MATHEMATICAL MODELING OF HEAT AND MASS TRANSFER PROCESSES IN THE DURATION OF GRAIN ROASTING

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Abstract

A mathematical model has been developed that describes the behavior of oilseeds in the oil press auger channel. The aim of this research was to obtain equations that will allow determination of the average speed in the auger channel, as well as to find the pressure at the end of the auger channel in front of the filtration zone.

Safflower, an oilseed crop of the family *Astrovidae*, the most widespread in the arid regions of Central Asia, was taken as the object of study. The method of mathematical modeling in order to select rational press parameters for extracting oil from safflower seeds mathematically describes the movement of oilseeds in the inter-turn space of the auger. A mathematical model of the extraction process of vegetable oil is proposed under the assumption that the movement is unidirectional throughout the entire inter-turn space of the auger, and allows one to determine the pressure at the end of the inter-turn space of the auger directly in front of the filtration zone. The derived equations will allow us to determine the average speed in the inter-turn space and the pressure at the end of the auger channel directly in front of the filtration zone.

As a result, the developed mathematical model formed the basis for creating an algorithm for designing oil-pressing equipment, namely, in the calculated part of the working chamber and the oil-press auger. The model allows to make the right choice of design features of the grain chamber oil press, adapted for a certain type of vegetable oilseed.

Thus, in the course of mathematical modeling, dependencies were obtained that formed the basis for the creation of the CAD system “Maslopress”, which allows calculating the design parameters of the main components of the pressing equipment.

Key words: Roasting, Grain, Mathematical model, Heat and mass transfer, Roaster.