

Chapter 11

Resource–Saving Technology of Dehydration of Fruit and Vegetable Raw Materials: Scientific Rationale and Cost Efficiency

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ABSTRACT

Thousands of tons of fruit and vegetables are lost annually during harvesting, transportation, and storage. Meanwhile, there is a problem of insufficient consumption of fruit and vegetables in the diet of modern people which results in an increase in the occurrence of alimentary-dependent diseases. One of the possible solutions to these two interrelated problems is the development of a technology of processing of substandard raw materials directly at the harvesting site. This study aims at the development of the technology of dehydration of fruit and vegetables applicable in a field. The economic effect of the proposed solution is contingent on the reduction of losses at the stage of cleaning and saving water resources and saving transportation and storage costs.

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INTRODUCTION

Contemporary globalization processes emerge new challenges to food security. Concentration of people in big cities aggravates food supply problems. Since 1950, the share of urban population in the world has increased from 30% up to 54% and is expected to reach 66% by 2050. Megalopolises with population over ten million people are at particular risk in terms of stable food supply due to the complex logistics, high intensity of economic activity, cascade effects in case of failures in functioning of separate elements of infrastructure, critical dependence on food and agricultural products produced outside urban areas.

There are fears of increased food insecurity in different countries including developed ones. One of the reasons of hunger are losses of food and agricultural raw materials which is a complex problem worldwide. For example, in the EU and Russia, major factors of food losses are losses during cleaning (about 11%), consumption (10%), and processing and packaging (4%). Annual losses of vegetables and melon are about 3.5% of the total output. Particular, in 2017, Russia's domestic production vegetables, cucurbits, fruit, and berries totaled 18.6 million tons. At a stage of cleaning, 559.26 thousand tons were lost, not to mention processing and other stages. Reduction of losses is one of the factors of food security improvement and decrease in adverse environmental effects of agriculture and food processing.

Food and Agriculture Organization of the United Nations (FAO) focuses on the development of policies to reduce food losses and spoilage. The methodology elaborated by the FAO as part of a global initiative to reduce food losses and damage in food preservation is the basis of many reports developed to analyze critical points in food value chains and identify possible solutions and strategies to reduce food loss. Considerable losses of food during storage, transportation, and retail trade have different nature and different reasons in developing and developed countries. In developing world, major losses happen during harvesting, transportation, pre-processing, and storage of agricultural products and raw materials due to underdeveloped technologies, lack of availability of expensive modern equipment, as well as organizational issues. In the developed countries, significant losses (up to 30%) happen in retail trade and at end users. In a number of developed countries, governments respond to food losses problem by the implementation of large-scale program actions.

Another global challenge to food security is the problem of hidden hunger associated with the intensification of technological processes and the saturation of food market with refined food. The issue has been becoming common and increasingly relevant for both poorer and richer states. Hidden hunger causes chronic deficiency of vitamins and minerals in diet. Life in environmentally neglected urban zones requires higher consumption of vitamins. Modern technologies of food production do not promote preservation of the most valuable products. Decrease in volume of consumed food and its partial replacement by industrially developed foodstuff lead to the development of year-round deficiency of minor food components in diet. The effect has been registered in many countries worldwide. It may provoke development of a large number of alimentary and dependent metabolic disorders and diseases. The problem becomes even more adverse in the conditions of frigid climate, poverty, stress, location, and shortage of particular elements in soil and water. Hidden hunger has particular negative effect on pregnant and lactating women and children.

Indirectly, the problem of hidden hunger is influenced by the emergence of agro-holdings which strive to every intensification of agricultural production. This process leads to sharp polarization of rural people in employment opportunities and income level. It provokes structural unemployment in rural areas and deterioration in social status of rural dwellers. Rural unemployment is associated with increasing transaction expenses owing to territorial distribution of population and places of application

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