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RESEARCH RESEARCH TECHNOLOGIES DRYING MEDICINAL HERBS

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Annotation. The article discusses the results of research on the technology of drying medicinal herbs. In technological processes, the main, main and most important operation is carried out - drying of products. Product quality, cost and energy consumption depend on it. To obtain dried plant material, in which all its valuable components and properties are maximally preserved, drying technology and its parameters are of great importance. The drying process described above provides an individual approach to products with different moisture and thickness, density and other quality characteristics. An experimental study of the drying of medicinal herbs based on the developed technology in Tashkent State Technical University was carried out.

Key words: technology, moisture, process, medicinal herbs, drying.

In the general technological chain, drying of medicinal herbs is a responsible and important operation. With improper drying, you can not only significantly reduce, but completely destroy the medicinal substances contained in the raw materials.

Enzymes exhibit enhanced activity, especially at elevated temperatures and in a humid environment, which is often observed when parts of the plant wither, if they are tightly laid and air is difficult to access [1-3].

Plant resources include not only useful plants, but also the entire vegetation cover, since life on Earth is impossible without plants. The study of natural plant resources has been ongoing for a long time and intensively. Rich flora can produce a significant amount of food. However, the level of use of natural plant wealth depends not so much on the diversity of flora, but on the degree of development of science and technology.

Currently, more and more attention is paid to the study of medicinal plants - an invaluable gift of nature. The use of medicinal plants and herbs for the treatment of a wide variety of diseases and ailments gives sustainable positive results. Therefore, herbal treatment (herbal medicine) is widely used both in traditional medicine and in alternative, alternative medicine.

The correctly selected method of drying the raw material provides good quality and appearance of the raw material. His choice depends on the morphological structure of plants (leaves, fruits, flowers, etc. are dried differently) with the biologically active substances contained in them.

A properly dried medicinal plant must meet the following requirements:

- save after drying the medicinal substances present in the plant;
- must not contain impurities of other plant species;
- preserve the aroma, taste and color characteristic of this plant.

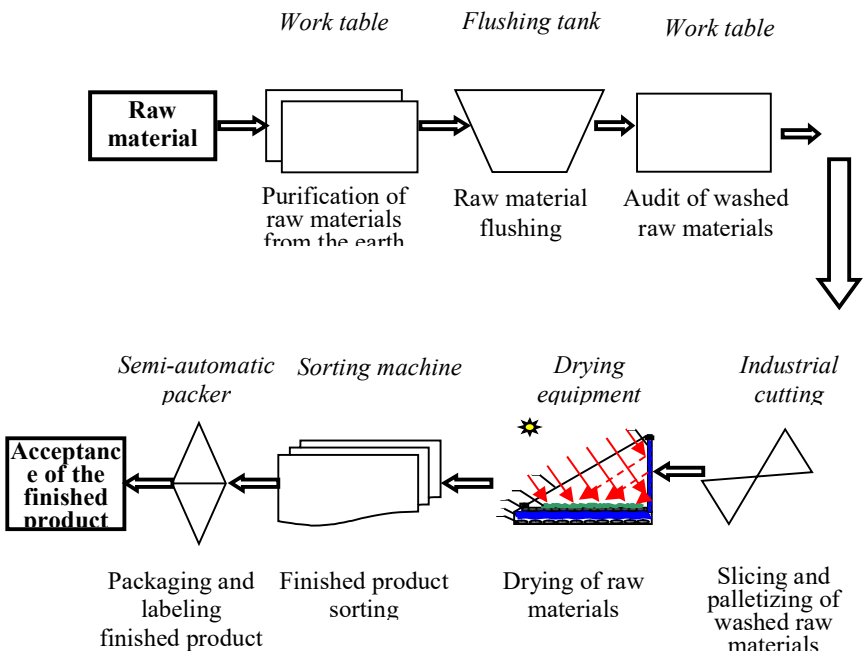

Fig. 1. A graphic diagram of a technological process for the production of dried medicinal herbs

The drying technology provides for a production line of processing from receipt of raw materials to packaging and sale of finished products (Fig. 1). First of all, according to the requirements of the Pharmacopoeia of the Republic of Uzbekistan, the technology requires the cleaning of raw materials from the earth and litter. To do this, you need visual inspection of raw materials on the desktop with the presence of mesh trays. Washing of raw materials, as a separate operation, is provided in the technological scheme, although it is rarely carried out, mainly for root plant substances, for example, Jerusalem artichoke, rose hips. Basically, this operation is skipped for non-root products, due to the fact that plant materials are delivered to collection points in a pure form. After washing, the raw material is revised additionally. The next operation is the cutting of raw materials into parts, carried out with the aim of uniform grinding for further drying and packaging. Otherwise, the drying time of the raw materials will be increased and to place it will require a lot of space in the drying chamber and packaging. Currently, mechanical circular knife choppers are often used, in which the length of the chopped raw material is not regulated. In our scheme, a chopper is laid in which cutting of raw materials of a certain length is provided. Subsequently, the raw materials laid in the trays manually are laid in drying cabinets.

Then, in accordance with the technological scheme, the main, main and most important operation is carried out - drying the products. Product quality, cost and energy consumption depend on it.

It should be noted that when carrying out the above drying process, an individual approach to products having different moisture and thickness, density and other qualitative characteristics is provided. Here it is impossible to approach the drying process as a mechanical work or the process of rotation of some nodes or parts. Drying with IR emitters should have a percentage of tolerance of raw materials for use in drying technology so that the raw materials, on the one hand, should be dried, and on the other, should not burn. Given this tolerance, this technology provides for the operation of drying the raw materials in natural conditions.

The drying process is carried out to such a stage when the smallest parts of the chopped raw material

are dried. If heating continues, some of the feed may burn. Plant materials contain both thin leaves and thicker branches and stems. Drying of plant materials over time can take from 15 to 30 minutes. Therefore, this operation is not difficult, does not take much time compared to the total time for the entire technological process (depending on the volume, condition of products, etc.) [4].

To obtain dried plant material, in which all its valuable components and properties are maximally preserved, drying technology and its parameters are of great importance.

The drying process by infrared heating is different from conventional drying, in which the structural-mechanical, technological and biochemical properties of the material, the ratio of ash and organic components are changed. When using the process of dehydration under consideration, there are no qualitative changes; the dehydrated material differs from the initial one only in the percentage of water, retaining its structure and percentage of biologically useful components [5-6].

The process of drying a medicinal herb, nettle, has been studied at Tashkent State Technical University. Consider a generalized drying curve for different temperatures.

As can be seen from Fig. 2, the period of constant drying speed occupies a larger area than the period of the falling drying speed. This indicates the intensity of drying with infrared heating.

The temperature of the material does not change during the entire period of constant drying speed and is equal to the temperature of the wet thermometer, and the partial pressure of the vapor at the evaporation surface is equal to the saturation pressure at the temperature of the wet thermometer.

The period of a constant drying rate continues until the critical moisture content wscr (Fig. 2), at which the intra-diffusion and external-diffusion resistances are equal. At this point in time, the moisture content of the material on the surface of the evaporation is hygroscopic or less than it, and in the center it is much more hygroscopic. Therefore, the critical moisture content can be defined as the average integral moisture content of the material, at which hygroscopic moisture content is achieved on the surface and the period of the decreasing drying speed or the second drying period begins.

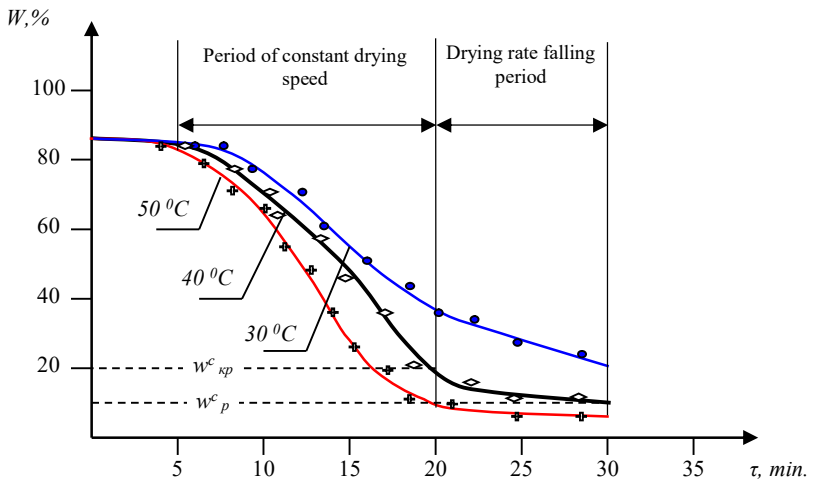

Fig. 2. Nettle grass drying curve

The advantages of this technology include the fact that the evaporated water can be condensed in a barocondenser and collected in a water tank. It can be used for drinking or technical purposes. The barocondenser also has the ability to collect volatile essential oils, which are subsequently used in the food industry. Medicinal products after this drying method, undoubtedly, have the status of environmentally friendly products.

An empirical dependence of the critical humidity W_{cr} on temperature t is obtained in the form W_{cr} = 46.5–0.5 t.

For critical humidity $W_{cr} = W_н - N\tau_1$ in relationship $W_i = W_н - N\tau_{1i} \le W_{кр}$ and $W_K = W_{кр} - e^{K\tau_{2i}} \le W_p$ the values of the dimensionless coefficients N and K are obtained depending on the temperature t,

N=3+0,02 t и K=-0,267+0,0088 t.

This dependence was obtained by processing the drying curve in the time interval from τ_1 before τ_2.

Favorable temperature conditions and high drying speed are the main technical advantages of the proposed technology for dehydration of useful components of medicinal plant materials.

The study showed that when plants are heated to temperatures above 50 °C, the work of enzymes is significantly weakened, and often completely stops. In view of this, to obtain the best results, drying should be, as a rule, quick and carried out at a temperature of 40-50 °C.

Medicinal herbs, which are close to nettle in thermophysical properties, can be described by similar curves. Therefore, this analysis technique allows you to use it for other similar herbs.

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