Conclusions

1.
2.
3.

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Rassmotreno structural approach and energy to Increase Durability agricultural machines. Author optymalnыe proposals parameters of the resistance spot uprochnenyya, Production of details IZ kompozytsyonnыh pryvodyat materials for Significant Reduction yznashyvanyyu details and nodes agricultural machines in the process Tehnicheskoe s operation.

Durability, abrazyvnoe yznashyvanye, samozatachyvanyya effect, blade Lemekh, paw cultivator, hammer kormodrobylky, kompozytsyonnыe materials, tochechnoe uprochnenye.

Examine of structure and energetic approach for increase durability of agricultural techniques. Propose of author of the optimal parameter hardening point consumable and electrode are welding of flux cored electrode, produce detail of cermet's material cause to important diminish intensive of wear detail and assembly agricultural techniques at process of technical operation.

Durable, abrasive wear, effect, self-sharpening, blade share, cultivator tooth, hammer grinding, hardening, point wise consumable, cermet's material.

631,365 UDC: 635.54

EXPERIMENTAL RESULTS DOSLIDZHENSCHODO ENSURING QUALITY OF ITS TSYKORIYUKORENEVOHO drying

I.V. Nezdvetska, Ph.D.
Zhytomyr National Agroecological University

The results of studies of the impact of technological parameters of infrared drying chicory roots in energy intensity process in relation to quality indicators obtained material. In experiments formalized process parameters of the drying process and final material quality indicators and parameters defined rational process of drying chicory roots of the periodic effect of infrared radiation on the material.

Drying, chicory root, infrared radiation exposure period, the period of softened, quality indicators, inulin.

Formulation of the problem. According to the approved Concept Development and vegetable processing industry [1], Ukraine has all the prospects to be among the world leaders in producing products of plant origin. However, the constant increase in energy costs, high quality requirements of the final product and environmental production technologies lead to higher production costs and reduced competitiveness in the domestic and foreign markets. Given this, there is a need to find and rational justification structurally technological parameters of production and processing of plant products in the direction of increasing its ultimate quality and reduce production enehomistkosti in general.

Drying plant products, including Chicory Root, is a rational way to continued food and merchantability. Despite the considerable amount of theoretical and experimental studies on the general theory of drying required additional formalization of relationships between properties vysushuvanoyi material and technical and technological parameters of equipment, taking into account the combined effect of technological process parameters on the quality characteristics object drying.

Analysis of recent research. Traditionally dry chicory root is in the steam conveyor dryers, drying agent which is heated using steam heaters air. This energy consumption ranged from 1.8 to 3 kWh per 1 kg of evaporated moisture [3, 4, 8]. In addition, a drying equipment rather cumbersome and difficult to maintain - 6 conveyor belts require a corresponding number of electric and other assistive devices. Large air flow in the convective drying [3] resulted in the need for high-quality equipment for purification of air emissions from heat and residual particles suspended material. In addition to relatively high costs of energy, the shortcomings discussed dryers include uneven drying due to stiffness of the material [4].

Comparative evaluation of performance and energy consumption of known drying technologies has shown that technology using infrared (IR) radiation is characterized by the lowest specific energy consumption per

1 kg of water evaporated, the value of which an average of 1.7 ... 2.85 times lower than existing technologies drying. However, it found that the periodic energy performance infrared radiation at drying facilities can speed drying at 30 ... 40%, reduce the negative impact of high temperatures on the material to maintain its qualitative and organoleptic characteristics to the maximum level [2, 5 6, 10, 11].

The object of the research is the process of drying chicory roots of discontinuous action of infrared radiation energy to the material. The study conducted regression analysis of the technological process parameters, criterial variables were thus the rate of evaporation of moisture from the material and chicory inulin content of dried roots.

Review of studies on the search for sustainable technologies drying plant materials showed that to ensure efficient infrared drying plant materials that are critical to high temperatures (chicory root and a number of materials of plant origin, etc.) used variables regimes exposure to the impact of flows of heated air under a softened [2, 4, 5]. This will both reduce overall energy consumption for drying and preserve the qualitative characteristics of the material. However, given the complexity of the structure of plant materials, networking technological process parameters and quality of the material obtained experimental research needs.

The purpose of research is the search for rational conditions of drying, depending on the technology partners of the process - the ratio between the periods of exposure (topr) and softened (tvidl) feed rate (u) and temperature (Tpov) acting on the material in the softened. Data obtained from studies [6] have shown that the most rational drying chicory is the use of infrared emitters with those of the wavelength of maximum radiation energy $\lambda_{max} = 1,5...3,9$ m, corresponding to the surface temperature of the radiator $T = 500...1600^0 C$.

Results. To verify the findings of theoretical research and the establishment of rational modes of periodic radiation used laboratory instruments and installations, drying chamber closed (Fig. 1); IR emitter; Laboratory scales AD-300; heater with integrated temperature control; stopwatch; anemometer APR2; single-phase electricity meter GEM 134.01.2. Laboratory unit (Fig. 1) consisted of drying oven, which is divided by a partition into two zones - exposure (2) and softened (6). As an IR emitter (5) used: electric infrared radiator as a ceramic tube with metal spiral with a wavelength of maximum radiation energy $\lambda_{\max} = 2,0$ *мкм* That corresponds to the radiator surface temperature T = 1177 °WITH; electric infrared radiator as a ceramic tube with metal spiral with a wavelength of maximum radiation energy $\lambda_{\max} = 2,5$ *мкм* That corresponds to the radiator surface temperature T = 887 °WITH.

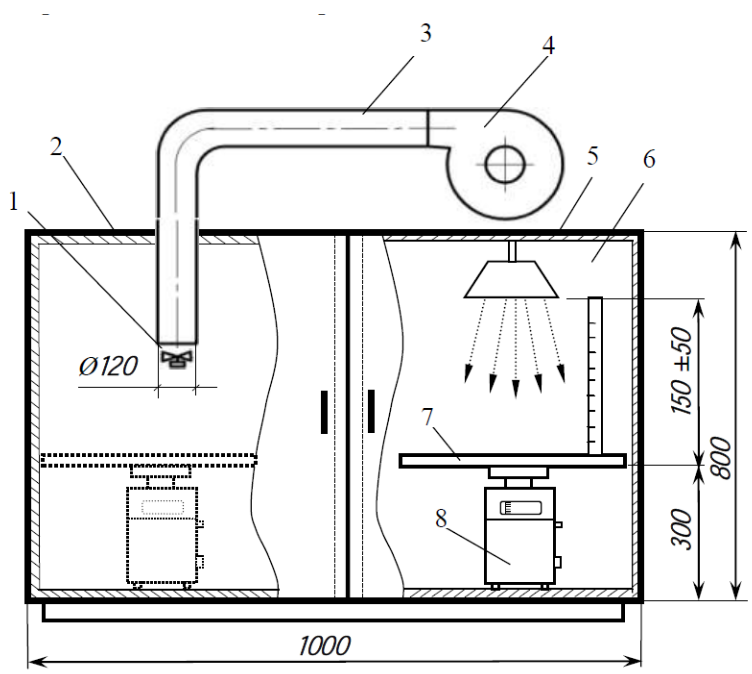

Fig. 1. Scheme of laboratory setup to determine rational parameters discontinuous IR drying 1 - anemometer APR2; 2 - camera softened; 3 - duct; 4 - heater; 5 - IR emitter; 6 - cell exposure; 7 - Stand with the object of drying; 8 - scales.

The duration of exposure was determined on the basis of studies [6] so that the temperature at the center of a piece of material is not exaggerated value 70 C. After the irradiation, the material passed to the camera softened. While in the cell softened material subject to the action flow of heated air from the heater reported TVP-500, which envisaged the possibility of adjusting the feed rate and air temperature. The influence of radiation on the parameters of a periodic process performance and quality indicators of material on the rules multivariate experiment revealed the plan 24-1 rational value of the wavelength of maximum radiation energy and get the regression equation (1), (2) to the wavelength of maximum radiation energy $\lambda_{\max} = 2,0\ мкм$ and $\lambda_{\max} = 2,5\ мкм$ in accordance:

$$\frac{\Delta W}{\tau} = 0,024 + 0,0033u + 0,06 \cdot 10^{-3} T + 0,06 \cdot 10^{-3} \tau_{опр} - 0,3 \cdot 10^{-4} \tau_{відл}, \quad (1)$$

$$\frac{\Delta W}{\tau} = 0,025 + 0,004u + 0,00012T + 0,00003\tau_{опр} - 0,000036\tau_{відл}, \quad (2)$$

where: $\frac{\Delta W}{\tau}$ - Average speed drying,% / min; u - The speed of the air supply when softened, m / s; T - air temperature, °WITH; $\tau_{опр}$ - Duration of exposure to the material, c; $\tau_{відл}$ - Duration of softened material, p.

Approximation of experimental data in the material allowed to get regression equation inulin content (In%) In the roots of chicory of technological process parameters for the wavelength of maximum radiation energy $\lambda_{\max} = 2,0$ *мкм* and $\lambda_{\max} = 2,5$ *мкм* in accordance:

$$In = 60,05 - 0,064u - 0,195T - 0,06t_{опр} + 0,007t_{відл}, \quad (3)$$

$$In = 66,75 - 0,009u - 0,197T - 0,09t_{опр} + 0,012t_{відл}, \quad (4)$$

where: $\frac{\Delta W}{t}$ - Average speed drying,% / min; u - The speed of the air supply when softened, m / s; T - air temperature, °WITH; $t_{опр}$ - Duration of exposure to the material, c; $t_{відл}$ - Duration of softened material, p.

To assess the impact of technological parameters of drying material in the batch to it energy of infrared radiation and convection air action, consider the value of the specific energy intensity of the process:

$$N_{пит\ заг} = \frac{N}{\Delta W \cdot In}, \quad (5)$$

where: $N_{пит\ заг}$ - The specific energy intensity of the drying process, kWh / kg;
N- Total energy consumption to supply heat to the material kWh;ΔW- The amount of moisture removed from the material, kg; In - Inulin content in the dry matter weight of material%.

Approximation of the values of specific energy intensity allowed to get regression equation, reflecting its dependence on technical parameters of the drying process, temperature (Tpov,°*WITH*), The rate of flow of air (u, m / s), the duration of exposure period (topr, c) and the duration of the period softened (tvidl, c).

Therefore, specific energy consumption when drying installing infrared emitters with a wavelength of maximum radiation energy $\lambda_{\max} = 2$ *мкм* and $\lambda_{\max} = 2,5$ *мкм* in accordance:

$$N_{пит\ заг} = 0,049 + 0,000012T_{пов}^{2} - 0,0006T_{пов} + 0,0001t_{опр}^{2} + 0,003u, \quad (7)$$

$$N_{пит\ заг} = 0,048 + 0,000014T_{пов}^{2} - 0,0008T_{пов} + 0,000122t_{опр}^{2} - 0,00019u, \quad (8)$$

Pairwise research on extreme equations (1) - (8) allowed to determine rational values of technological parameters of pulsed-termoradiatsyonno konvektivnoho drying chicory roots (Table. 1).

1. Rational value of technological parameters of drying chicory roots at periodic convection-infrared thermal effect on the material.

spe ed, u, m /	per atur e, T	opr omi yuv ann	od tvidl soft ene	Quality Score process

				$\frac{\Delta W}{\tau}$ % / Min.	In % / Suh.rech.	$N_{пит\ заг}$, KWh / kg ·%
The wavelength of maximum radiation energy $\lambda_{\max} = 2,0 мкм$						
0.7 ... 0.8	25 ... 30	30 ... 35	90 ... 100	0.46 ... 0.48	54 ... 56	0,044
The wavelength of maximum radiation energy $\lambda_{\max} = 2,5 мкм$						
0.9 ... 1.1	30 ... 35	45 ... 50	100 ... 120	0.53 ... 0.54	54 ... 58	0,042

Conclusion. Using infrared technology in drying chicory roots drying method is rational not only in terms of reducing energy consumption, but also from the standpoint of quality characteristics increase drying facility. The research process parameters Batch of energy infrared radiation on the roots of chicory with their drying, allowed to determine rational values of these parameters (Table. 1), which provide content inulin at 54 ... 58% relative to the solids content, in 1 4 ... 1.55 times the content of inulin in the roots, dried convective manner.

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Otrazhenы results of research Effect of process parameters tehnolohycheskyh infrared drying roots in tsykoryya энerhoёmkost process on quality indicators for relations poluchennoho material. As a result of эksperymentov poluchenы equation rehressyy, kotoryya formalyzuyut Technological parameters of the drying process and qualitative indicators finite material, as well as pozvoljajut opredelyt ratsyonalnыe Options tehnolohycheskoho drying process with roots tsykoryya Periodically Impact infrared radiation on the material.
Drying, chicory kornevoy, infrared radiation, irradiation period, period otlёzhky, quality indicators, inulin.

The results of researches of influence of technological parameters of process of infrared drying of roots of chicory are reflected on power-hungryness of process in relation to indexes of quality of got material. As result of experiments equalizations are got regressions which formalization of technological parameters of process of drying and high-quality indexes of eventual material and similarly allow to define the rational parameters of technological process of drying of roots of chicory with periodic influence of infrared-radiation on material.
Drying, chicory root, infrared-radiation, period of irradiation, period of binning, high-quality indexes, inulin.

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Kinetics of the mixed feed MIXING

HA. Holub, PhD
OHM. Achkevych Engineer

Powered studying the kinetics of the process of obtaining the mixed feed in order to obtain uniform distribution of the components in the mixture is set livestock standards.
Mixing, uniformity, kinetics, feed, mix.

Formulation of the problem. From the distribution of components in the prepared feed mixtures depends on the degree of assimilation of nutrients

substances and consequently animal performance and specific fuel feed to obtain a unit. Increasing uniform distribution of components in the mixture to 97% or more, compared to a satisfactory state distribution