INFLUENCE OF CONVICTED DRYING IS ON STORAGE OF SHEETS STEVIA

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The results of experimental researches are presented in relation to kinetics of the convicted drying of stevia and with application of method of differential sweepable calorimetries were investigational motion of processes which take a place in the process of drying. The terms of storage sheets stevia are studied dried at different temperatures and the researches of energy mode of the convicted drying of stevia is made to order to industrial application: temperature 100/60 °C, duration of 75 min., a rate of movement air is 2-2,5 m/sec.

Keywords: sheets of stevia, dryings, quality, storages, moisture

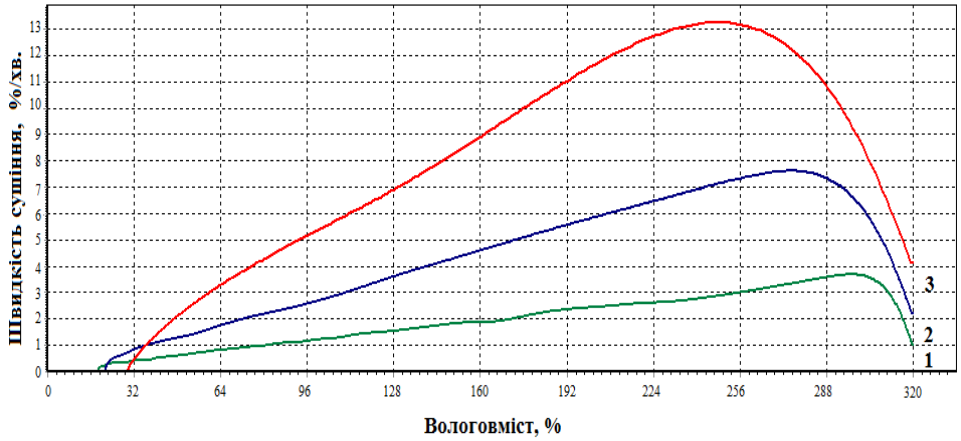
Entry. With development agrarian a sector and a scientific segment in relation to providing of food industry high-quality raw material was acquired also development theoretical and practical bases of drying of digester. Stevia is a plant, what «sensible» to maintenance of surplus moisture and at the slow drying very quickly loses own commodity quality. In addition, from drying depends and quality of sheets stevia during storage. For the production of sheets stevia in the industrial volume of the assured quality more acceptable is application convicted drying. However, a method is given had studied and in literary information researches absent in relation to motion of processes which take a place during drying of stevia and storage of its sheets [1, 2].

The purpose of work is a study of influence of drying of sheets stevia on their quality during storage.

Methods and methods of researches. Kinetics of the convicted drying was probed jointly with the scientists of Institute of technical physics thermal NAN of Ukraine on an experimental stand. Biochemical changes which took a place during drying studied jointly with the scientists of the Ukrainian research institute of

butters and NAAN grew fat by the method of differential sweepable calorimetries (DSK) with application of differential sweepable calorimeter of QDSC-20 Termo Fisher SCIENTIFIC (IntertechCorporation, in 2008). The standards of sheets are got analyses on accordance the indexes of quality and determined their changes during storage [3].

Results and their discussions. Researches of kinetics of the convicted drying of stevia (ric.1) rotined that moisture drying an agent most influences on intensity of drying on the initial stage of constant-speed. Thus there is a decline of moisture from 20 to a 10 g/kg of dry air which provides a rev-up process in 1,2 (ric. 1 curve 3). At the increase of moisture a transmitter of thermal the period of the permanent drying is increased amount of the evaporated moisture.



Ric. 1. Dependence of speed of drying is on moisture transmitter of thermal:

1 – 40 °C, 2 – 60 °C, 3 – 80 °C

With the subsequent exception of moisture from sheets the degree of this influence a parameter on intensity goes down and takes a place limitation of speed of diffusion of moisture from a sheet. From lines. 1 evidently, that drying takes a place in three stages (tabl. 1).

Table 1 - Stages of the convicted drying of stevia

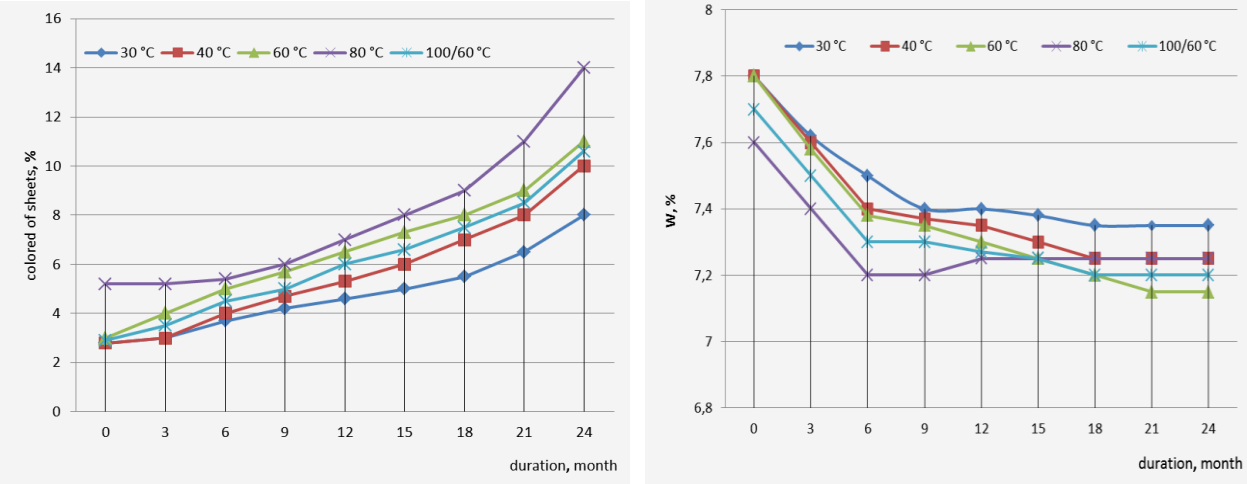
Temperature °C	Moisture, %		
	I	II	III
40	310,4	288	19,2
65	300,8	256	22,4
80	278,4	224	28,8

I period is short-term and characterizes the period of warming up of raw material, for which speed of drying arrives at a maximal value. II period is the short period of speed of drying (part of curves is outbowed) which characterizes speed of external diffusion. In the same period speed of internal moisture grows to the surface of puff vehicle. A maximum transition from II to the III period characterizes internal diffusion of moisture that evenness of process. Completion of III period of drying is characterized deleting of part of moisture from the capillaries of puff vehicle. The moisture into a cage of comes in motion and at this time walls of cages have high permeability for moisture. That in this period the process of adsorption of certain amount of moisture is possible from the supersaturated air by the surface of puff vehicle. The mid-coefficient of diffusion makes 0,249-0,895 m^2/min and a relative coefficient of diffusion is 0,118-0,193 [1].

Application of DSC-method in research [5] of drying of sheet, stem and surface part allowed to specify the mode of drying. It is set that the compatible drying of stem and sheet is «softened» by terms and promote firmness of connections of sheet to the high temperatures. It is got the results of researches allow to recommend the convicted drying of two studied of stevia: I period on an entrance 95-105 °C and on the output of 75-85 °C and on the II period - on an entrance and output 60-65 °C. It will provide an exception on the first stage of drying of basic part of moisture (35-40%) and decline of duration of process in 1,65 [6].

The studied influence of drying on ability of raw material to keep basic biologically valuable matters even at «ideal terms». Dried standards of sheets stevia (*Stevia rebaudiana Bertoni*) at temperatures 30 (standard 1) 40 (standard 2), 60 (standard 3), 80 (standard 4) and 100/60 °C (standard 5) kept during two years [7]. Smell and taste properties of the first three standards of the dried sheets stevia did not change at storage (*Stevia rebaudiana Bertoni*). Discoloration sheets is marked during two years of storage (ric. 2). In particular, the colored from green to

rifle-green grows at sheets a standard 1 on 5,5% (68,8%), to the standard 2 – 7,5% (75%), to the standard 3 – 8,2% (74,5%), to the standard 4 – 8,8 % (62,9%) and to the standard 5 – 7,7% (72,6%). More intensively sheets darkle to the standard 4 and the increase of maintenance of sheet brown is marked on 25% during storage which testifies to violation of structure of puff vehicle during drying. Such sheets are not suitable to realization or processing.



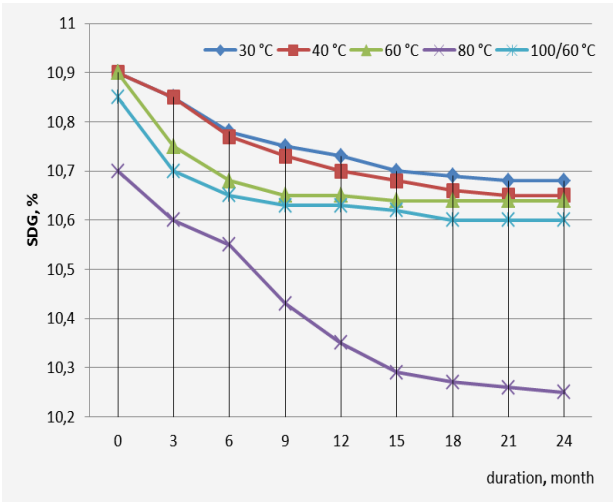
a b

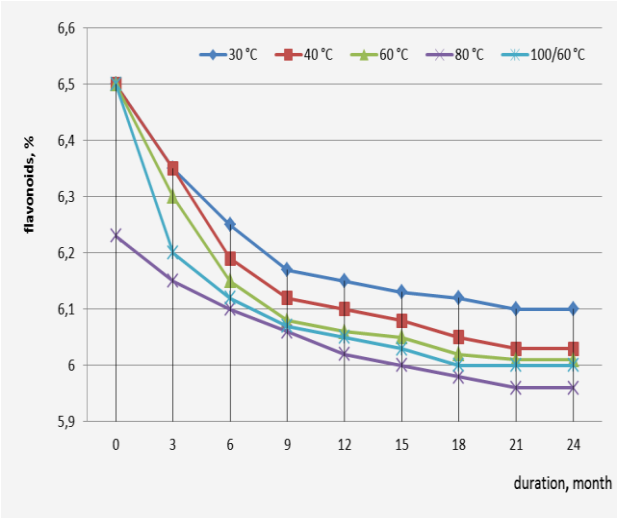
Ric. 2. A change of colored of sheets (a) and maintenance of mass particle of moisture (b) is in the dried sheets stevia during storage

During storage, even at favorable terms, sheets lose part of moisture for maintenance a turgor. For two years of storage standard 1 loses moisture 0,45%, standard 2 – 0,55%, standard 3 – 0,65% and standard 5 – 0,5%. Standard 4 for a year loses a 0,6% moisture, whereupon adsorbs a 0,05% moisture. Standard 4, as researches show, finds out a capacity for adsorption of particle of moisture from air (to 0,8%). Otherwise grows a degree of destruction standard to 0,8 that прискорює the process of his spoilage and does impossible processing.

Studied the use of bioresources of sheets during storage for maintenance their turgor by establishment of change maintenance of matters diterpene glicosedes (ric. 3а) and flavonoids (ric. 3б). It is set that sheets lose the

overwhelming particle of diterpene glicosedes (80-83 %) and flavonoids (87,5%) during first-year of storage.





a b

Ric. 3. A change of maintenance diterpene glicosedes (a) and flavonoids (b) is in the dried sheets stevia during storage

During two years of storage a standard has most losses diterpene glicosedes of standart 4 (4,2% from the lump sum of SDG), the least standard 1 (2%). Near values have standards 2, 3 and 5, the losses of which makes 2,3%. Obviously, first year storage is the most vulnerable for the biosystem of sheet, which then becomes more adapted to the optimum terms and outlays the not far of bioresources.

Conclusions. Kinetics of the convicted drying is studied and perspective of application of the convicted drying of two studied (100/60 °C) is rotined pilot-scale at the rate of movement air of transmitter of thermal 2-2,5 m^2/sec during 75 min, which reduces duration of process in 1,65, researches of energy on 15-17 % but provides the production of sheets of the assured quality with its maintainance during two years. By a DSC by a method grounded influence of drying of surface part of stevia on the indexes of quality of sheets during storage. It is well-proven that the most vulnerable in storage of sheets stevia is the first year in which outlaid for maintenance the turgor of puff vehicle of diterpene glicosedes 80-83 % from

the general amount of losses of SDG and flavonoids - 87,5% from the general amount of losses of flavonoids. Certainly, that application of high temperatures (more than 80 °C) during drying of stevia worsens quality of sheets and does impossible their storage and processing.

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