JERUSALEM ARTICHOKE (HELIANTHUS TUBEROSUS) – PROSPECTS OF USE IN THE FOOD INDUSTRY

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Abstract

Modern society is paying more and more attention to healthy nutrition. Urgent issues are the spread of diabetes and the possibility of reducing its negative impact on the human body. According to statistics, more than 4 million patients in Russia have been registered with this disease, the overwhelming majority suffering from type II diabetes. Therefore, scientists worldwide are studying the products containing inulin, and one of its sources is the Jerusalem artichoke. Interest in this plant lies not only in the fact that its tubers contain functional nutrient in the form of inulin (2-20%) but also in the fact that they are rich in dietary fiber, macro-, microelements and contain almost all the essential amino acids that allow keeping the body at a high immune level. The present research studies the influence of the storage conditions and period of Jerusalem artichoke tubers on its chemical composition. The correlation coefficient helped establish linear structural relationships between quality indicators and storage conditions, according to which the carbohydrate, vitamin C and dry matter content primarily depend on the temperature regime (r = -0.8 - (-0.4)). The information-logical method made it possible to confirm the previously established correlation interrelations. The obtained models for assessing the quality of tubers (including inulin content), depending on the storage and temperature regime, allow promptly changing the storage conditions, if necessary. The analysis made it possible to single out a promising variety for industrial processing as an additive in the preparation of soft drinks such as sbiten. The authors established the optimal shelf life of the beverage so that it does not change from the category of non-alcoholic concentrates to fermented beverages; this allows preserving the size of tariffs.

Keywords: Tubers; quality; processing; storage conditions; correlation coefficient; statistical indicators; information and logical analysis.
I. Introduction

Improper diet worsens negative trends in the health status of people. The level of spent energy in the body must correspond to the level of received energy; otherwise, subject to a sedentary lifestyle (not counting genetic predisposition), the person is threatened with diabetes (XII, XXV, VIII). Diabetes is one of the most common diseases in the world; according to the World Health Organization, 422 million people suffered from diabetes in 2014 (VIII). Statistics shows that in Russia (as of January 1, 2016), 4.3 million patients were registered with this disease, 3.9 million of cases being type II diabetes (XXV). The World Health Organization (VIII) sees the solution in changing diet and increasing physical activity of the population, as these methods are more effective than the subsequent drug treatment. Scientists around the world are studying the replacement of easily digestible carbohydrates (such as sucrose) in food, and it has been established that polysaccharides of plant origin (in particular, inulin) are well digested and absorbed by diabetic patients in large doses, and at the same time they do not affect the level of glucose and insulin in blood (XV, XXVIII).

The Jerusalem artichoke (*Helianthus tuberosus*) is a culture that has received much attention recently. One of the main features of this plant is the accumulation of inulin as a reserve polysaccharide; its content in tubers ranges from 2 to 30%. Moreover, in addition to prebiotics, Jerusalem artichoke tubers contain vitamins of groups B, PP, ascorbic acid, β-carotene, biotin, macro- and microelements.

The Jerusalem artichoke protein contains almost all essential amino acids. The mineral composition of tubers is represented by such elements as potassium, magnesium, calcium, phosphorus, iron, zinc, silicon (IV, XXVI, XXI, XXIII, III). Prebiotics of the Jerusalem artichoke (inulin and inulodextrins) contribute to the preservation and restoration of the microbiota, vitamins, and macro- and microelements, which allows maintaining the body’s immune status and antioxidant system at a high level (XXI).

The global range includes more than 300 varieties and hybrids of the Jerusalem artichoke, including 12 wild plants, but in Russia only 5 are included in the State Register (XXVII, XXIV). Table 1 presents the data on the content of inulin in some varieties of the Jerusalem artichoke tubers.

| Table 1: Inulin content in the Jerusalem artichoke tubers |
|---------------------------------------------------------|
| **Variety**     | **Dry matter, %** | **Inulin calculated as dry matter, %** | **Source**        |
| Dietary         | 21.71±0.14        | 35.42±0.31                              | Leontyev, 2014    |
| Violet de Rennes| 20.47±0.20        | 34.45±0.19                              |                   |
| Blank Brekos    | 22.05±0.17        | 36.30±0.42                              |                   |

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Currently, studies show that the Jerusalem artichoke can be used to prepare highly effective drugs needed to correct the metabolism in case of diabetes, atherosclerosis, obesity, kidney, liver, cardiovascular and gastrointestinal diseases, to prepare fruit and vegetable drinks and purées, coffee drinks and also as an ingredient in cooking (IV, XXVI, VI, XXXII, X, XI, VII, XIII). The issues of conserving tubers as a source of raw materials and of selecting promising areas and technologies for creating products from the Jerusalem artichoke are not sufficiently covered and require additional research.

The present research aims at identifying the storage conditions for the Jerusalem artichoke tubers used as a raw material for sbiten and at establishing their optimal shelf life.

II. Materials and Methods

Natural conditions. The studies were carried out in the Perm Krai (non-chernozem zone of Russia) in the Western Cis-Urals region, coordinates 56° 06'–
61°39’ N. and 51°47’-59°03’ E., the region stretches for 600 km from north to south, and from west to east, the length of the southern part of the region is 200 km, and 500 km of the northern. The region is diverse in physico-geographic and agricultural conditions. The climate is moderately continental, the coldest month being January and the hottest July (XIX). The duration of the frost-free period ranges from 80 to 120 days. Depending on the area, 300 to 800 mm precipitation falls annually. The biological coefficient of productivity is 1.3-2.0; the climate index of biological productivity in case of natural moisture is 75-110 points (V). All this characterizes the region as satisfactory in terms of growing agricultural crops, including the Jerusalem artichokes.

Experiment. Tubers of the zoned varieties Skorospelka and Mestnywere grown in LLC Agrofirma Usadba (57°55′0.80" N 56°17′2.83" E). Before storage, the tubers were sorted by size and quality, washed, air-dried and packaged in polymer bags with the capacity of up to 1 kg. The bags were placed in refrigerators and stored at temperatures (+ 2 ± 2)°C, (-20 ± 2)°C and (+ 20 ± 2)°C for three months. Samples were taken after 1, 2 and 3 months, crushed with a plastic grater with 1.5 mm holes. Tubers were analyzed for dry matter, vitamin C, total sugar and inulin. The solids content was determined by the gravimetric method (drying to constant weight). The concentration of vitamin C was determined by extracting with hydrochloric acid solution and subsequent titration with sodium 2,6-dichlorophenolindophenolate solution. The sugar content was determined by the permanganate method with titration, the inulin content was determined by the hexacyanoferrate method. LLC Production-commercial firm ‘Blagodat’ conducted tests on the use of Jerusalem artichoke tubers as the main ingredient for the soft drink sbiten. The quality of the drink was determined by organoleptic, physico-chemical and microbiological indicators.

Statistical analysis. Statistical data analysis was performed using Microsoft Excel and STATISTICA 8 (regression and dispersion) programs, and ALI (developed in the Altai State Agrarian University by L.M. Burlakova and D.I. Ivanichkin). Models for predicting the Jerusalem artichoke quality indicators were based of structural relationships with storage conditions; to establish these, two approaches were used: correlation and information-logical.

III. Results and Discussion
To analyze the tubers quality, the organoleptic parameters established by the Russian regulatory document – GOST 32790-2014 – were determined (Table 2).
Table 2: Organoleptic indicators of the quality of Jerusalem artichoke tubers

| Indicator                | Characteristics according to GOST 32790-2014                                      | Skorospelka                              | Mestny                                   |
|--------------------------|----------------------------------------------------------------------------------|------------------------------------------|------------------------------------------|
| Appearance               | Tubers are fresh, intact, not damaged by diseases and pests, clean, without roots, covered in peel (typical shape and colour for botanical varieties), without excessive external moisture, without brown spots caused by heat, without green hue, not sprouted or frostbitten | Tubers are fresh, intact, not damaged, clean, pear-shaped, covered with smooth, white skinned, not sprouted or frostbitten | Tubers are fresh, intact, not damaged, clean, rounded, covered with smooth sandy brown skin, not sprouted or frostbitten |
| Insides                  | Typical for botanical varieties. Flesh is light yellowish, with pearly shimmer on the fresh cut | Light yellowish, with pearly shimmer on the fresh cut | Gray yellowish, with pearly shimmer on the fresh cut |
| State                    | Hard, able to withstand transportation, loading, unloading and delivery to destination | Hard                                     |                                          |
| Smell and colour         | Sweetish, peculiar to this botanical variety, without foreign smell and (or) taste | Sweet; no foreign smell or taste         |                                          |
| Size of tubers by the largest transverse diameter, mm, for varieties: |                                    |                                          |                                          |
| - with rounded tubers    | 35                                                                               | –                                        | 35.8                                     |
| - with elongated tubers  | 25                                                                               | 25.4                                     | –                                        |
| The presence of rotten, frostbitten or steamed tubers | Not allowed                                                                     | Absent                                   | Absent                                   |

The visual assessment of the Jerusalem artichoke showed that the tubers meet the standard requirements; therefore, they can be sold in retail and/or processed. The next stage of quality testing is physico-chemical analysis.

One of the most important indicators of quality is the dry matter content in the plant. The composition of the dry matter of plants includes 90-95% of organic compounds and 5-10% of mineral salts. The nutritional value of root and tuber crops is determined mainly by the content of carbohydrates, in particular sugars (XIV, XVIII, XVII, II). The quantitative and qualitative composition, depending on the variety, may differ significantly (Table 3).
Table 3: The content of carbohydrates and dry matter in Jerusalem artichoke tubers grown on the territory of Russia (XIV, XVI, XVII)

| Indicator     | Novost VIR | Violet de Rennes | Interest | Skorospelka | Omsk white | Pasko | Solnechny |
|---------------|------------|------------------|----------|-------------|------------|-------|-----------|
| Dry matter, % | 19.7-21.2  | 18.7             | 24.2-27.6| 18.8-23.5   | 22.1       | 22.6  | 23.5      |
| Total sugar, %| 10.7       | 11.4             | 18.6-20.0| 9.9         | 16.2       | 12.2  | 18.6      |
| Inulin, %     | 5.68-5.78  | 4.23             | 2.10-9.87| 5.20-8.23   | 7.19       | 7.10  | 8.25      |

The studied varieties differ in quality characteristics: Skorospelka tubers are more juicy, the dry matter content is 21.1 ± 0.4%, while in Mestny tubers it is 23.8 ± 0.5%. An analysis of the carbohydrate content showed that Skorospelka has lower total sugar than Mestny, as evidenced by diagrams below (Fig. 1). At the same time, the level of inulin in the tested varieties is within the same range - 15-16%.

![Statistical parameters of carbohydrate content in Jerusalem artichoke tubers, %](image)

Total sugar, %  
Inulin, %

1 – Skorospelka, 2 – Mestny

Fig. 1: Statistical parameters of carbohydrate content in Jerusalem artichoke tubers, %

During storage of tubers, chemical and biological processes take place determining not only the quality of the raw material but also of the final product. Therefore, the Jerusalem artichoke was stored at different temperatures for three months; the results of the change in the quality of tubers are presented in Figures 2, 3.
The quality of the tubers depended on the storage conditions, with the temperature regime having a stronger effect than the duration. Positive temperatures had a negative effect on vitamin C and total sugar – their mass fraction at (+20 ± 2)°C decreased (compared to the initial content) by 57.8 and 10.8%, respectively. The accumulation of total sugar at negative temperatures can be explained by the hydrolysis of spare polysaccharides under the action of inulase and invertase which remain active in tubers during refrigerated storage. The storage was accompanied by

Fig. 2: Influence of the storage and temperature on the quality of Jerusalem artichoke tubers of the Skorospelka variety
a decrease in the mass fraction of inulin, and after three months, it was 61.9% lower than the original level.

![Graphs showing the influence of storage and temperature on the quality of Jerusalem artichoke tubers of the Mestny variety]

**Fig. 3**: Influence of the storage and temperature on the quality of Jerusalem artichoke tubers of the Mestny variety

The storage conditions led to the withering of the tubers and the loss of their juiciness, as evidenced by the dry matter content: at harvesting, its level was 23.4-24.2%, the temperature regime changed it to 24.2-31.4%. The amount of vitamin C decreased at positive temperatures, its concentration reached the minimum at (+20 ± 2)°C. Towards the second month of storage, mass fraction of total sugar increased to
The decrease in the inulin content during storage in cooled and frozen form is marked by the fact that the hydrolytic processes of decay in tubers are activated, which is a response of the plant organism to low temperatures. During the third month of storage, microbiological deterioration began at a temperature of (+ 20 ± 2)°C, resulting in a sharp decrease of the carbohydrate content and a significant loss of inulin (4.6%).

To obtain models for assessing the quality of tubers depending on storage conditions, it is necessary to establish the level of relationship closeness between them, which will allow including only the significant indicators in the equations. Table 4 shows the relationships between the studied properties.

**Table 4: Correlation between the indicators of quality, duration of storage and temperature conditions (at P = 0.95)**

| Indicators | Storage, month | Temperature, °C | Dry matter, % | Total sugar, % | Inulin, % | Vitamin C, IU |
|------------|----------------|-----------------|---------------|----------------|----------|--------------|
| **Skorospelka** | | | | | | |
| Storage, month | 1.000 | 0.000 | -0.056 | 0.341 | -0.293 | 0.344 |
| Temperature, °C | 0.000 | 1.000 | -0.221 | -0.789 | 0.467 | -0.742 |
| Dry matter, % | -0.056 | -0.221 | 1.000 | 0.411 | 0.612 | 0.534 |
| Total sugar, % | 0.341 | -0.789 | 0.411 | 1.000 | -0.350 | 0.850 |
| Inulin, % | -0.293 | 0.467 | 0.612 | -0.350 | 1.000 | -0.195 |
| Vitamin C, IU | 0.344 | -0.742 | 0.534 | 0.850 | -0.195 | 1.000 |
| **Mestny** | | | | | | |
| Storage, month | 1.000 | 0.000 | 0.321 | -0.422 | -0.436 | 0.502 |
| Temperature, °C | 0.000 | 1.000 | 0.692 | -0.430 | 0.024 | -0.578 |
| Dry matter, % | 0.321 | 0.692 | 1.000 | -0.637 | -0.673 | -0.206 |
| Total sugar, % | -0.422 | -0.430 | -0.637 | 1.000 | 0.448 | 0.158 |
| Inulin, % | -0.436 | 0.024 | -0.673 | 0.448 | 1.000 | -0.313 |
| Vitamin C, IU | 0.502 | -0.578 | -0.206 | 0.158 | -0.313 | 1.000 |

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Direct and inverse correlations of various level of closeness between the studied factors are noted. The content of dry matter in Mestnyi is largely dependent on the storage temperature; Skorospelka demonstrates no such dependence. The storage conditions and the dry matter content of the tubers determine carbohydrate and vitamin C content. Having a close relationship \((r \geq 0.6)\), it is possible to make prediction models of tubers quality indicators, which allows determining the change in the raw material composition during storage. Based on the regression analysis, adequate prediction models were obtained for the main qualitative indicators of the tubers depending on the temperature regime (Table 5).

**Table 5: Statistical indicators of models and their confidence parameters**

| Model 1. \(Y_1 = 24.0 + 0.144X + 0.00936X^2\) |
|---|---|---|---|---|---|
| \(\eta\) | \(R^2\), % | 0, % | Confidence interval (at 95% level) | Significance level |
| 0.87 | 76.4 | 24.0 | \(14.4 \times 10^{-2}\) | \(93.6 \times 10^{-4}\) | \((23.5; 24.5)\) | \((12.6 \times 10^{-2}; 16.2 \times 10^{-2})\) | \(78.8 \times 10^{-4}\) | \(108.4 \times 10^{-4}\) | 0.000 | 0.000 | 0.000 |

| Model 2. \(Y_2 = 38.7 - 0.605X - 0.0257X^2\) |
|---|---|---|---|---|---|
| \(\eta\) | \(R^2\), % | 0, % | Confidence interval (at 95% level) | Significance level |
| 0.83 | 68.7 | 38.7 | \(60.5 \times 10^{-2}\) | \(25.7 \times 10^{-3}\) | \((36.5; 40.9)\) | \((-68.2 \times 10^{-2}; -52.8 \times 10^{-3})\) | \((-32.5 \times 10^{-2}; -18.9 \times 10^{-3})\) | 0.000 | 0.000 | 0.001 |

| Model 3. \(Y_3 = 22.1 - 0.0612X\) |
|---|---|---|---|---|---|
| \(\eta\) | \(R^2\), % | 0, % | Confidence interval (at 95% level) | Significance level |
| 0.79 | 62.2 | 22.1 | \(61.2 \times 10^{-3}\) | \(-\) | \((22.0; 22.2)\) | \((-69.3 \times 10^{-3}; -53.1 \times 10^{-3})\) | \(-\) | 0.000 | 0.000 | \(-\) |

Note: The numerator contains the values for the first model, the denominator contains the values for the second model, \(Y_1\) is the dry matter content in Mestnyi tubers, \(\%\), \(Y_2\) is the content of vitamin C in Skorospelka tubers, IU, \(Y_3\) – total sugar in Skorospelka tubers, \(\%\); \(X\) – storage temperature, °C; \(\eta\) – correlation ratio, \(R^2\) – determination coefficient, \(\theta\) – reliability criterion

Knowing the storage mode, one can predict the level of dry matter, vitamin C, total sugar and adjust the temperature value. Calculated prediction models have an average determination coefficient (not less than 0.60) and reliability criteria above 50%, i.e. are of high quality. Simple models do not describe all indicators of tubers quality, so for a detailed assessment of the relationship, information and logical

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analysis was used which helped establish the closeness and form of the structural relationship between the quality indicators and storage conditions (Table 6).

**Table 6: The results of information and logical analysis between the quality indicators of tubers and storage conditions**

| Indicator | Dry matter | Vitamin C | Total sugar | Inulin |
|-----------|------------|-----------|-------------|--------|
|           | Storage    | Storage   | Storage     | Storage |
|           | temperature| temperature| temperature | temperature |
| Skorospelka|            |           |             |         |
| H (A)*    | 1.7439     | 1.7117    | 1.8399      | 1.8895  |
| H (B)     | 1.9923     | 2.0000    | 2.0000      | 2.0000  |
| T (A/B)   | 0.4028     | 1.0139    | 0.7048      | 0.8058  |
| K (A/B)   | 0.2028     | 0.5060    | 0.3524      | 0.4029  |
| Mestny    |            |           |             |         |
| H (A)*    | 1.1383     | 1.1303    | 1.8895      | 1.4501  |
| H (B)     | 2.0000     | 2.0000    | 2.0000      | 2.0000  |
| T (A/B)   | 0.3745     | 0.8104    | 0.8058      | 0.6556  |
| K (A/B)   | 0.1873     | 0.4052    | 0.4029      | 0.3278  |

Note: H (A) - the uncertainty of the phenomenon under study (storage conditions); H (B) is the uncertainty of the factor under study (level of the qualitative trait); T (A/B) – total information content, i.e., the amount of information coming from factor B to phenomenon A; K (A/B) – coefficient of information transfer efficiency from factor B to phenomenon A.

The most informative indicator is the inulin content: the total information content T (A/B) is maximum (1.2163 in Skorospelka grade and 1.0945 in Mestny) with high information transfer efficiency ratios (0.6084 and 0.5473), which indicates great closeness of the relationship between inulin content and storage temperature. To enhance the influence of storage conditions on the Jerusalem artichoke quality, the following row was formed: temperature → storage, and vice versa for vitamin C in Mestny. The resulting structural relationships were used to develop prediction models for tubers qualitative signs (Table 7).
Table 7: Statistical indicators of models (p< 0.05)

| Models       | \( \eta \) | \% \( R^2 \) | \% \( \theta \) |
|--------------|------------|-------------|-------------|
| Skorospelka  |            |             |             |
| 1 \( Y_2 = -71.9 - 0.516 \times X + 5.83 \times X_1 + 4.41 \times X_2 \) | 0.9105 | 82.9 | 81.3 |
| 2 \( Y_3 = 13.4 - 0.0566 \times X - 0.485 \times X_1 + 0.283 \times X_2 \) | 0.9165 | 84.0 | 81.9 |
| 3 \( Y_4 = 38.9 + 0.0520 \times X - 0.0132 \times X_1 + 0.000091 \times X_1^2 - 1.01 \times X_3 \) | 0.9649 | 93.1 | 92.2 |
| Mestny       |            |             |             |
| 4 \( Y_1 = 21.4 + 0.144 \times X + 1.28 \times X_1 + 0.00936 \times X_2^2 \) | 0.9311 | 86.7 | 85.4 |
| 5 \( Y_2 = 27.0 - 0.300 \times X + 5.23 \times X_1 \) | 0.7655 | 58.6 | 56.1 |
| 6 \( Y_3 = 1612 - 179 \times X_1 + 6.71 \times X_1^2 - 0.0831 \times X_2^2 \) | 0.8894 | 79.1 | 77.2 |
| 7 \( Y_4 = 1433 - 150 \times X_2 + 5.27 \times X_2 - 0.0615 \times X_2^2 \) | 0.7273 | 52.9 | 48.4 |

Note: \( Y_1 \) – dry matter in tubers, %, \( Y_2 \) – vitamin C in tubers, IU, \( Y_3 \) – total sugar in tubers, %, \( Y_4 \) – inulin in tubers, %; \( X \) – storage temperature, ºC, \( X_1 \) – storage, month, \( X_2 \) – dry matter in tubers, %, \( X_3 \) – total sugar in tubers, %.

The resulting models are qualitative, as they have high levels of adequacy. The equations obtained for the Skorospelka variety have higher levels of the determination coefficient and the reliability criterion.

Based on the conducted research, the tubers of Jerusalem artichoke of the Skorospelka variety were selected as raw materials for a soft drink. In order to expand the assortment and the number functional products, non-alcoholic concentrate – sbitten (syrup) was produced at the request of LLC production-commercial firm ‘Blagodat’. Sbitten is a traditional ancient Russian hot drink made from water, honey and spices, which often included medicinal herbal preparations. This drink replaced tea until the beginning of the 20th century. Currently, the scope of application is extensive. Added to hot water, sbitten can be taken as a standalone product or as an additive in various drinks (tea, coffee, chicory, etc.), and it can be used as dessert topping (ice cream, milkshakes, confectionery).

For the preparation of sbitten, the Jerusalem artichoke was the main ingredient among the plant components, its share being 69.9%. The obtained drink was examined at the testing laboratory of LLC Research and Certification Center ‘Federal’. The results of the examination are presented in Table 8.
Table 8: Qualitative and quantitative characteristics of sbiten

| Indicator                        | Characteristic and rate as required OS 65126456-002-2015 | Sbiten with Jerusalem artichoke 'DariDobro’ |
|----------------------------------|------------------------------------------------------------|-------------------------------------------|
| Contents                         | Honey syrup, Jerusalem artichoke, lemon, sage, cinnamon, cloves, currant leaves, oregano, nutmeg |
| Appearance                       | Homogeneous uniformly colored viscous fluid              | Homogeneous, uniformly colored, viscous |
| Tate and smell                   | Spicy aromatic taste and smell due to the characteristics of the raw materials used |
|                                  | Spicy aromatic taste and smell due to honey and Jerusalem artichoke |
| Colour                           | Conditioned by the raw materials used                    | Brown                                     |
| Dry matter, %, not less          | 50                                                        | 52.7                                      |
| QMAF ANM, CFU/cm³ (g), not more  | $5 \times 10^4$                                           | $1 \times 10^4$                           |
| Coliform bacteria, g             | 1                                                         | Absent                                    |
| Pathogenic microorganisms, g     | 25                                                        | Absent                                    |
| Energy value, not less, kcal/kJ  | –                                                         | 380/1590                                  |
| Carbohydrates, not more, g       | –                                                         | 95                                        |
| Shelf life, months               |                                                           | 12                                        |

Evaluation of the obtained syrup revealed the following competitive advantages: fast production technology; the minimum duration of cooking (which allows preserving all the nutrients); low cost of the main raw materials and components; functional properties.

IV. Conclusions

The research of two Jerusalem artichoke varieties, conducted in the Perm Krai, shows that Skorospelka is preferable for growing in this region. The main choice criteria were the greatest stability of quality indicators (dry matter, inulin content) during storage for all the studied modes. Jerusalem artichoke tubers used for processing should be stored at $(\pm 2 \pm 2)\^\circ\mathrm{C}$ for three months and at $(-20 \pm 2)\^\circ\mathrm{C}$ for one month.

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month; such conditions will allow keeping the maximum concentration of inulin. Storage at (+ 20 ± 2)°C should be limited to 14-15 days, as the quality of tubers begins to deteriorate in the following days due to microbiological processes. To ensure continuous supply of fresh Jerusalem artichoke tubers to retail chains and to raw materials sites of processing enterprises, it is recommended to store them at a cool temperature of (+ 2 ± 2)°C. The information-logical analysis established that the decisive criterion for the change in quality is the temperature regime, the second being the storage period. The obtained adequate prediction models allow establishing the level of qualitative signs of Jerusalem artichoke tubers depending on storage conditions. For producing functionally oriented food, the Jerusalem artichoke variety Skorospelkais recommended, which makes it possible to obtain sbiten with a long shelf life and the maximum amount of healthy substances.

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