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"FOODCLIPPER" – A HOUSEHOLD DEVICE FOR THE DURABLE SAVING OF NUTRITIONAL FRUIT AND VEGETABLE RAW MATERIALS

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The confidence of the average consumer in fruit and vegetable raw materials, semi-finished products and finished products of industrial production remains extremely restrained, though they are forced to buy daily. The need is especially acute in the presence of a garden plot and garden, or when it is possible to buy fruit and vegetable raw materials at a fair for a reasonable price. Fresh fruit and vegetable raw materials can be stored, but even in the presence of consumables for a short time – the more they contain moisture, the wrinkling and decay begins faster, and, accordingly, the nutritional value is reduced rapidly. Almost every consumer before, and perhaps now accompany unclear whence arise on hand or foot glass or polymer cans / bottles and lots of caps and closures. Of course, this is the convenience of everyday life – just in case of packaging from under conservation. It may be advisable to review the relationship to freezing, fermentation, grinding, drying and canning by giving 1 (good)... 5 (bad) with a priority in the "FOOD VALUE" aspect. Thus, it seems appropriate to create structural and technological conditions for the long-term storage of the nutritional value of fruit and vegetable raw materials in a powdered state during «warm» drying and production of non-preservative and even colorless drinks immediately before consumption. Using the "KULER" used household appliances as a basis, it is considered possible to create the newest concept of the "FOODCLIPPER" appliance, the peculiarity of which is to carry out all the processes within the appliance itself and to ensure from the loading of raw materials to the disconnection of the glass / bottle with ready beverage in oxygen-limited environment.

Keywords: foodclipper, nutritional value, non-preservative drinks.

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Introduction

The confidence of the average consumer in fruit and vegetable raw materials, semi-finished products and finished products of industrial production remains extremely restrained, though they are forced to buy daily. The need is especially acute in the presence of a garden plot and garden, or when it is possible to buy fruit and vegetable raw materials at a fair for a reasonable price. Fresh fruit and vegetable raw materials can be stored [1–5], but even in the presence of consumables for a short time – the more they contain moisture, the wrinkling and decay begins faster, and, accordingly, the nutritional value is reduced rapidly.

Presenting main material

Almost every consumer before, and perhaps now accompany unclear whence arise on hand or foot glass or polymer cans / bottles / jars and lots of caps and closures. Of course, this is the convenience of everyday life [6, 7] – just in case of packaging from under conservation. Perhaps it is advisable to ask yourself why to keep it?! It may be advisable to review the relationship to preserves and preservatives, for example, by giving in points 1 (good)... 5 (bad) with priority over the "FOOD VALUE" aspect.

1. Freezing – 32 points:

1.1 REMAINDER (1) – Vitamins by 70–90% and trace elements by 90–100%;

1.2 DURATION (5) – up to 10 months;

1.3 TASTE (2) is fairly close to primary raw material;

1.4 CONSERVANT (2) – additional moistening possible;

1.5 PREPARATION (2) – if necessary, removal of damage, twigs, bones, cutting;

1.6 PROCESSING (4) – very energy intensive (up to 2 hours in the freezer at $T \leq -20^0C$);

1.7 PACKAGING (1) – Disposable leak-proof

container;

1.8 STORAGE (5) – extremely energy-intensive (freezer at T≤–20⁰C);

1.9 COOKING (5) – energy-intensive defrosting;

1.10 RESTRICTIONS (5) – freezer, risk of condensation and mold formation, risk of thawing/freezing, re-freezing.

2. Fermentation – 28 points:

2.1 REMAINDER (2) – Vitamins by 70–80% and trace elements by 80–90%;

2.2 DURATION (2) – up to 24 months;

2.3 TASTE (3) is another product that is quite salty;

2.4 CONSERVANT (4) – the need for the preparation of brine, preserving plants;

2.5 PREPARATION (5) – if necessary, removing damage, cutting, teaching;

2.6 PROCESSING (1) – non-energy-intensive (up to 300 hours in a tub at T≤18⁰C);

2.7 PACKAGING (3) – Reusable wooden leakproof containers;

2.8 STORAGE (3) – only in cool, regular flushing;

2.9 COOKING (3) – requires some preparation before use;

2.10 RESTRICTIONS (2) – cool storage space.

3. Rubbing – 30 points:

3.1 REMAINDER (3) – vitamins 60–70% and trace elements 60–70%;

3.2 DURATION (4) – up to 10 months;

3.3 TASTE (5) is another product that is very sweet;

3.4 CONSERVANT (3) – ready-made sugar;

3.5 PREPARATION (3) – if necessary, removal of damage, twigs, bones, cutting;

3.6 PROCESSING (2) – low energy (sugar pouring and mechanical grinding);

3.7 PACKAGING (2) – multiple leakproof containers;

3.8 STORAGE (4) – sufficiently energy-intensive (refrigerator at T≤12⁰C);

3.9 COOKING (1) – no preparation required;

3.10 RESTRICTIONS (3) – the presence of a refrigerator, only fruits and berries, too much sugar (more than 60%).

4. Drying – 26 points:

4.1 REMAINDER (4) – vitamins by 20–30% and trace elements by 80–90%, active dietary fiber;

4.2 DURATION (3) – within 12 months;

4.3 TASTE (1) – closest to the primary raw material;

4.4 CONSERVANT (1) – no need;

4.5 PREPARATION (1) – if necessary, removal of twigs, bones, cutting, decomposition;

4.6 PROCESSING (5) – extremely energy-intensive (up to 12 h. in a thermal chamber at TH≈70–90⁰C);

4.7 PACKAGING (5) – disposable sealed packaging;

4.8 STORAGE (1) – no special requirements;

4.9 COOKING (4) – requires long-lasting moisture before use;

4.10 RESTRICTIONS (1) There are no specific requirements.

5. Canning – 34 points:

5.1 REMAINDER (5) – vitamins by 10–20% and trace elements by 10–20%;

5.2 DURATION (1) – up to 36 months;

5.3 TASTE (4) – other product, sweet / sour;

5.4 CONSERVANT (5) – the need for the preparation of syrup / marinade, preserving plants;

5.5 PREPARATION (4) – if necessary, removal of twigs, bones, slicing, teaching;

5.6 PROCESSING (3) is very energy-intensive (up to 0.2p/h in a jar at T≈100⁰C);

5.7 PACKAGING (4) – multiple glass or metal sealed containers;

5.8 STORAGE (2) – only in the cool, ventilate the room;

5.9 COOKING (2) – requires little preparation before use;

5.10 RESTRICTIONS (4) – fragile glass containers require special conditions of transportation and handling, organization of the collection system, excessively harmful effects of sugar and vinegar.

Generalization in the form of Table 1 aspects (1–10) defines as the most attractive by the number of points (26) the method is drying, but not very convincing (28...34), and also has undesirable (4–5) aspects: "REMAINDER", "PROCESSING", «PACKAGING» and «COOKING».

Table 1

Aspects of long-term preservation of fruit and vegetable products in domestic conditions

#	Methods	Remainder	Duration	Taste	Conservant	Preparation	Processing	Packaging	Storage	Cooking	Restrictions	Σ
		1	2	3	4	5	6	7	8	9	10	
1	Freezing	1	5	2	2	2	4	1	5	5	5	32
2	Fermentation	2	2	3	4	5	1	3	3	3	2	28
3	Rubbing	3	4	5	3	3	2	2	4	1	3	30
4	Drying	4	3	1	1	1	5	5	1	4	1	26
5	Canning	5	1	4	5	4	3	4	2	2	4	34

It is advisable to consider these aspects in relation to modern structural and technological developments in the direction of long-term preservation of the nutritional value of fruit and vegetable raw materials and involvement in the production of unpreserved foods [8,9].

«REMAINDER» in the case of «warm drying», that is, when carrying out the temperature simulation

of the climatic environment of the plant growing zone – up to 30...60°C, with bringing the solids content up to 80...90% the probability of maintaining nutritional value is significantly increased and may contain vitamins up to 70...90% and trace elements up to 90...100%. But this requires a revision of the way to create «warm» conditions and technical implementation of the drying process. Keeping the activity of dietary fiber, it is possible to evaluate the «REMAINDER» of 4 in only 1 point.

«PROCESSING» in the implementation of «warm drying» needs to replace common devices created by the methods of convective, vibrating, spray, microwave or sublimation effects, the latest, created by the methods of vacuum or vacuum radiation. The additional involvement of cutting and / or chopping devices without affecting the quality significantly reduces the energy consumption and duration of the drying process. Keeping the nutritional value, it is possible to process the «PROCESS» of 5 even at 3 points.

"PACKAGING" formless pieces of raw material after "warm drying" requires bringing them to a powdery state, which is due to the desire to first reduce the volume of packaging and subsequently increase the rate of moisture. There is a need to involve devices for grinding the dried pieces and to create a reusable sealed container of the type of cartridges that are intended to hold, store and dissolve the powder. Keeping the nutritional value, it is possible to «PACKAGING» out of 5 only 1 point.

«PREPARATION» after prolonged storage of the powder is provided for its dissolution (moistening) in the container (cartridge) just before use. The technological time for the manufacture of the final product determines the duration of wetting of the powder, the acceleration of which is possible at increased temperatures (limitation in nutritional value up to 60°C) and the development of the contact surface (almost without restriction is laid during the grinding process at the stage «PACKAGING»). The expansion of technological capabilities of the range of products will be facilitated by the creation of various on the principle of action of the devices of implementation, if necessary, dispensing, dissolving, clarifying and mixing the concentrate of powder and liquid. Keeping the nutritional value, it is possible to «COOKING» from 4 overestimate to 3 points.

Generalization in the form of Table. 2, performed on the designated revision of aspects 1, 6, 7 and 9, made it possible to determine the method of drying most attractive not only by the lowest total number of points (16 instead of 26), but also by the minimum score (1) of the «REMAINDER» aspect.

Table 2

Aspects of long-term preservation of fruit and vegetable products in domestic conditions *

#	Methods	Remainder	Duration	Taste	Conservant	Preparation	Processing	Packaging	Storage	Cooking	Restriction	Σ
		1	2	3	4	5	6	7	8	9	10	
1	Drying	1(4)	3	1	1	1	3(5)	1(5)	1	3(4)	1	16
2	Freezing	2	5	2	2	2	5	2	5	5	5	35
3	Fermentation	3	2	3	4	5	1	4	3	4	2	31
4	Rubbing	4	4	5	3	3	2	3	4	1	3	32
5	Canning	5	1	4	5	4	4	5	2	2	4	36

Note: * – in brackets are given the points of aspects of the table. 1: «REMAINDER», «PROCESSING», «PACKAGING» and «COOKING»

However, further use of the finished product in the form of dissolved (moistened) fruit and vegetable powder is not directly possible [10–12], since it requires certain actions in the manufacture of the finished product (Fig. 1): thickening, molding and drying in the case of SNACK, thickening and milling in in the case of SMOOTHY, cooling and lighting in the case of DRINKING.

Common to all three types of finished products is the process of dissolving the powder to a state of concentrate, and then make it by personal technology. However, regardless of technology, the temperature effect remains almost the same, and, accordingly, the remainder of food benefits. The complication of technology is the fee for giving the end product a certain viscosity (band) and especially crunch (snacks). But in everyday use, if the condition,

a **b** **c**

Fig. 1. General appearance of the final products from fruit and vegetable raw materials:
a – crispy snacks; b – light smoothies or cocktails; in – refreshing refreshments

appearance and structure of the finished product is of no fundamental importance, it may be simpler and more convenient to make liquid cool or warm beverages (juices).

Unfortunately, most projects, even those that are theoretically grounded and experimentally worked out in the laboratory, are not being implemented for technical reasons.

Based on the fairly widespread operation of domestic coolers / liquid coolers (Fig. 2), there is an impression of their structural and technological development and sufficiently acceptable energy intensity, complexity and complexity in the case of beverage production.

With the same functionality, modern coolers [13–15] can be desktop (which is usually cheaper, but require removal of a large work surface of the kitchen) and floor (which can be installed anywhere, even outside the kitchen) with upper, preferably, and lower location of water tank (bottle). The priority function of household coolers is cooling the water, which is carried out by an electronic module (almost silent) to a temperature of 10...15^{0}C with a capacity of 0.5...1.0 p/h or a refrigeration compressor to a temperature of 5...10^{0}C with a capacity of 0.5... 2,0 p/h. Although more multifunctional models are becoming widespread, they are capable of: filtering water; to gas water; heat the water; protect children from hot water faucets; at the same time keep the water in a state – chilled/room/heated; store in perishable boxes tea, coffee, sugar and utensils at room temperature and in the refrigerator, perishable products at 6...9^{0}C.

The continued presence on the market of household appliances of water coolers, ie when the stage of distrust of a fundamentally new product has passed, gives grounds to consider them as suitable for further technical improvement of the basics. Keeping an attractive functional purpose on its basis it is possible to significantly expand the range of finished products, considering not only the production of a certain temperature of water, but also its combination with fruit and vegetable powdered raw materials for the manufacture of non-preservative drinks (juices).

In the direction of increasing the variety of everyday everyday food, we will consider the basic structural and technological difference between the existing COOLER appliance and what is considered appropriate for the creation of the newest FOODKLIPER household appliance (Fig. 3).

An existing "COOLER" household appliance, when in addition to the means of dispensing / dispensing, cooling / heating and water retention capacity, storage boxes are also provided at room temperature for attracted (manufactured) persons and packaged for long-term storage of dry products (tea, coffee, sugar). There may be an assortment of fruit and vegetable powders to dissolve non-preservative beverages with slow stirring in a glass of water. Advantages – there is no need for technical modernization, but only the organization of the purchase of powders. Disadvantages – Given the particular dependence of the nutritional value on the drying temperature of fruit and vegetable powders, doubts remain regarding the credibility of their benefits; doubts remain about whether or not to attract and harm from dyes and preservatives; organizational dependence on a single centralized bottled water supplier.

The concept of the newest "FOODCLIPPER" household appliance, when the units of feed or

a **b** **c**

Fig. 2. General view of typical coolers: a – desktop with electronic module; b – floor with built-in boxes; in c – floor with refrigerator

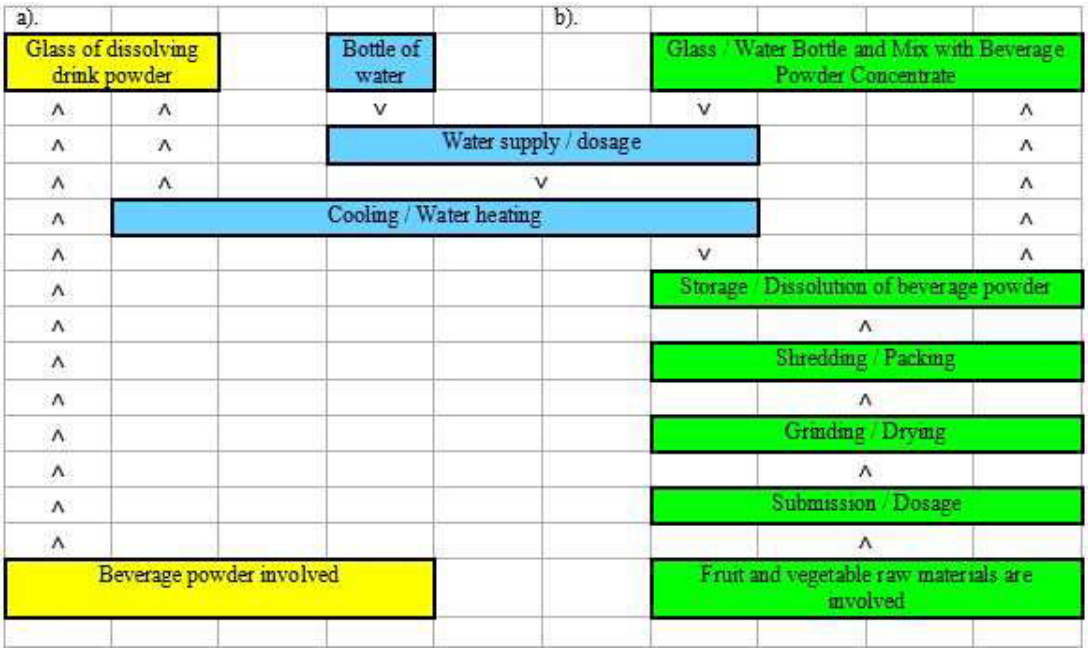

Fig. 3 Schematic diagram of structural and technological layout of coolers of a wide range of finished products: a – existing desktop; b – modernized floor

batching of whole or bits of fruits are added to the list of previously listed means and the creation of an oxygen-limited environment during grinding (cutting), drying, grinding, packaging, storage and dissolving without mixing in a temporarily connected glass/bottle. Advantages – the use of a water bottle to taste avoids dependence on a single bottled water provider; personal control of the temperature of the processes from the supply of fresh raw materials to the consumption of fresh drink; no need for preservatives and dyes; shelf life is limited by the capacity and quantity of storage; provided means of reducing oxygen in the environment during the implementation of processes from grinding to mixing of the drink; the freshness of the drink determines its direct production and use in the glass / bottle (first select some of the water to dissolve the powder and then return the concentrate for mixing with the rest of the water); the programmed and automatically controlled implementation of the processes from dispensing the self-prepared (washed) fruits of the attracted fruit and vegetable raw material to the preparation of the finished beverage leaves no reason for doubt about the nutritional value. Disadvantages – difficult technical modernization, the need to purchase fruit and vegetable raw materials.

Conclusions

Thus, it seems appropriate to create structural and technological conditions for the long-term storage of the nutritional value of fruit and vegetable raw materials in a powdered state during «warm» drying and production of non-preservative and even colorless drinks immediately before consumption. Using the "COOLER" used household appliances as a basis, it is considered possible to create the newest concept of the FOODKLIPER appliance, the peculiarity of which is to carry out all the processes within the appliance itself and to ensure from the loading of raw materials to the disconnection of the glass/bottle with ready drink in oxygen-restricted environment.

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«ФУДКЛІПЕР» – ПОБУТОВИЙ ПРИЛАД ТРИВАЛОГО ЗБЕРЕЖЕННЯ ХАРЧОВОЇ ЦІННОСТІ БЕЗКОНСЕРВАНТНОЇ ФРУКТОВО-ОВОЧЕВОЇ СИРОВИНИ

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Вкрай стриманою залишається довіра пересічних споживачів до фруктово-овочевої сировини, напівфабрикатів і готових продуктів промислового виробництва, хоча й вимушені їх щоденно купувати. Особливо гостро потреба відчувається у разі наявності присадибної ділянки городу та саду, або у разі можливості за прийнятну ціну купувати фруктово-овочеву сировину на ярмарку. Свіжу фруктово-овочеву сировину можна зберігати, але навіть при наявності витратних засобів нетривалий час – чим більше містять вологи, тим зморщування та гниття починається швидше, а, відповідно, й харчова цінність стрімко скорочується. Майже кожного споживача раніше, а можливо й зараз, супроводжують незрозуміло відкіля виникаючі під рукою чи ногою скляні або полімерні банки/пляшки/баклажки та безліч кришок і ковпачків. Зрозуміло, це зручність повсякденного побуту – на всяк випадок тара з-під консервації. Можливо, доцільно переглянути відношення до заморожування, заквашування, перетирання, висушування і консервування надаючи у балах 1 (добре) ... 5 (погано) з пріоритетом за аспектом «ЗАЛИШОК ХАРЧОВОЇ ЦІННОСТІ». Таким чином, доцільним виглядає створення конструкційно-технологічних умов із тривалого зберігання харчової цінності фруктово-овочевої сировини у порошкоподібному стані при «теплому» висушуванні та виготовлення безконсервантних і навіть безбарвникових напоїв безпосередньо перед вживанням. Використовуючи за основи відпрацьовану побутову техніку типу «КУЛЕР» вважається можливим створити новітню концепцію приладу типу «ФУДКЛІПЕР», особливість якого полягає у здійсненні усіх процесів в межах самого приладу та забезпечення від завантаження сировини до від'єднання келиху/пляшці із готовим напоєм у кисневмеженому середовищі.

Ключові слова: фудкліпер, харчова цінність, безконсервантні напої.

«ФУДКЛИПЕР» – БЫТОВОЙ ПРИБОР ДОЛГОВРЕМЕННОГО СОХРАНЕНИЯ ПИЩЕВОЙ ЦЕННОСТИ БЕЗКОНСЕРВАНТНОГО ФРУКТОВО-ОВОЩНОГО СЫРЬЯ

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Крайне сдержанной остаётся доверие обычных потребителей к фруктово-овощному сырью, полуфабрикатов и готовых продуктов промышленного изготовления, хотя и вынуждены их ежедневно покупать. Особенно остро потребность чувствуется в случае наличия приусадебного участка огороду и саду, или в случае возможности за приемлемую цену купить фруктово-овощное сырьё на ярмарке. Свежее фруктово-овощевое сырье можно сохранять, однако даже при наличии затратных устройств непродолжительный час – чем больше содержат влаги, тем сморщивание и гниение начинается быстрее, а, соответственно, и питательная ценность стремительно снижается. Почти каждого потребителя раньше, а возможно и теперь, сопровождают непонятно откуда возникающие под рукой или ногой стеклянные и полимерные банки/бутылки/баклажки и множество крышек и колпачков. Понятно, это удобства каждодневного быта – на всякий случай тара из-под консервации. Возможно, целесообразно пересмотреть отношение к замораживанию, заквашиванию, перетиранию, высушиванию и консервированию оценивая в балах 1 (хорошо) ... 5 (плохо) с приоритетом за аспектом «ОСТАТОК ПИЩЕВОЙ ЦЕННОСТИ». Таким образом, целесообразным представляется создание конструкционно-технологических условий для продолжительного сохранения пищевой ценности фруктово-овощно-

го сырья в порошкоподобном состоянии при «тёплом» высушивании и изготовлении безконсервантных и даже безокрашивающих напитков непосредственно перед употреблением. Используя в качестве основы отработанную бытовую технику типа «КУЛЕР» представляется возможным создание новейшей концепции прибора типа «ФУДКЛИПЕР», особенностью которого является совершение всех процессов в пределах самого прибора и обеспечение от загрузки сырья до отделения чашки/бутылки с готовым напоем в кислородоограниченной среде.

Ключевые слова: фудклипер, пищевая ценность, безконсервантные напитки.

"FOODCLIPPER" – A HOUSEHOLD DEVICE FOR THE DURABLE SAVING OF NUTRITIONAL FRUIT AND VEGETABLE RAW MATERIALS

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The confidence of the average consumer in fruit and vegetable raw materials, semi-finished products and finished products of industrial production remains extremely restrained, though they are forced to buy daily. The need is especially acute in the presence of a garden plot and garden, or when it is possible to buy fruit and vegetable raw materials at a fair for a reasonable price. Fresh fruit and vegetable raw materials can be stored, but even in the presence of consumables for a short time - the more they contain moisture, the wrinkling and decay begins faster, and, accordingly, the nutritional value is reduced rapidly. Almost every consumer before, and perhaps now accompany unclear whence arise on hand or foot glass or polymer cans / bottles and lots of caps and closures. Of course, this is the convenience of everyday life – just in case of packaging from under conservation. It may be advisable to review the relationship to freezing, fermentation, grinding, drying and canning by giving 1 (good)... 5 (bad) with a priority in the "FOOD VALUE" aspect. Thus, it seems appropriate to create structural and technological conditions for the long-term storage of the nutritional value of fruit and vegetable raw materials in a powdered state during «warm» drying and production of non-preservative and even colorless drinks immediately before consumption. Using the "KULER" used household appliances as a basis, it is considered possible to create the newest concept of the "FOODCLIPPER" appliance, the peculiarity of which is to carry out all the processes within the appliance itself and to ensure from the loading of raw materials to the disconnection of the glass / bottle with ready beverage in oxygen-limited environment.

Keywords: foodclipper, nutritional value, non-preservative drinks.

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