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EFFECTIVE MARKETING OF ECOLOGICAL RESOURCE-SAVING TECHNOLOGIES AT FOOD ENTERPRISES

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According to the world-famous Collins English Dictionary, the word of the year is «climate strike», which in the shortlist competed with «climate emergency», «climate crisis», «eco-anxiety». Climate change of the decade is considered a real shock not only to Ukraine but to the world as a whole. The United Nations World Food Program, the world's largest humanitarian organization, has been awarded the Nobel Peace Prize for its project «Food is the best vaccine against chaos.» However, world food prices in 2021 increased by 32.8%. There are many reasons for the promotion of inflation: drought; high demand for grain crops in China; Russia's export restrictions; rising oil prices; closed borders and outflow of labor. In 2022, the agricultural sector will face new challenges: higher prices for fertilizers (70... 300%) and maritime transport (300... 500%); energy crisis; inflated demand and political constraints; climate change. Given the trends of climate change, the author's team considers it appropriate to choose as the object of study one of the most water-intensive in cultivation and in demand in the use of vegetable crops – carrots, considering it as a «living model». A fairly thick cover layer contains a lot of nutrients, but too little fiber, which with the existing means of mechanized harvesting and processing injures and damages up to 40% of roots. With significant resources for growing, harvesting and storage, up to 25% of the crop is lost. Carrots are the most difficult crop to store. Thus, the development of the concept of «Convenient food» involves not only the intensification and revision of existing functions, but also to change the perception of the organization of technological processes, which will: save drinking water when washing roots by attracting some squeezed liquid; to preserve useful properties due to timely warm processing; avoid the above restrictions on the production and consumption of natural juice. The relatively high hardness of carrots limits the economic feasibility. Under the current circumstances, sufficient favorable conditions have not yet been created for the development and implementation of innovations.

Keywords: convenient food, saving of resources, useful properties, carrot powder.

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Introduction and research of publications

According to the world-famous Collins English Dictionary, the word of the year is «climate strike» [1], which in the shortlist competed with «climate emergency», «climate crisis», «eco-anxiety». Climate change [2] of the last decade is considered a real

shock not only to Ukraine but to the world as a whole. Heat and droughts are becoming more catastrophic. It is possible to move to late ripening and the introduction of new heat-loving crops, but this will be prevented by increasing the deficit of moisture. Some of the benefits of warming are likely

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Effective marketing of ecological resource-saving technologies at food enterprises



Fig. 1. In the last decades in July and August the amount of precipitation was 15... 27% less than the norm (a. [2]), while in the Dnieper detected 161 pollutants with a significant excess of content (b. [3])

to be short-lived, as in 15 to 20 years, yields are likely to decline from increasing drought frequency and temperature. Gradually, the sown areas of Ukraine are moving to the zone of risky agriculture (deficit of natural precipitation) and need watering (Fig. 1,a).

But the state of the Dnieper basin (Fig. 1, b) is actually catastrophic [3] – a significant excess of content: agricultural pesticides, pharmaceuticals and perfumes, metals..., as well as intensively growing water blooms caused by shallowing. It is believed [4] that vegetarianism will help curb climate change, while domestic farmers refuse to grow vegetables due to lack of moisture [5], and the diet of Ukrainians has recently undergone significant changes [6] – began to consume less fruit and vegetables and significantly more meat and meat products.

The United Nations World Food Program, the world's largest humanitarian organization, was awarded the Nobel Peace Prize for the project «Food is the best vaccine against chaos» [7]. However, world food prices [8] in 2021 increased by 32.8%. There

are many reasons for the promotion of inflation: drought; high demand for grain crops in China; Russia's export restrictions; rising oil prices; closed borders and outflow of labor. In 2022, the agricultural sector will face new challenges: higher prices for fertilizers (70...300%) and maritime transport (300... 500%); energy crisis; inflated demand and political constraints; climate change.

The purpose of the article

The article aims to formation of the positioning elements of the ecological resource-saving technologies of carrot processing at food enterprises.

Presenting main material

Only harvest, and there are already problems of storage during the winter so [9,10] that plant products do not lose flavor and useful properties for as long as possible. It is known that fresh fruit and vegetable products are best eaten soon after harvest, because, unlike industrial goods, are organisms that prolong life / respiration even after harvesting, long-term storage, preparation, processing, packaging, packing, forwarding, cooking, use and disposal in

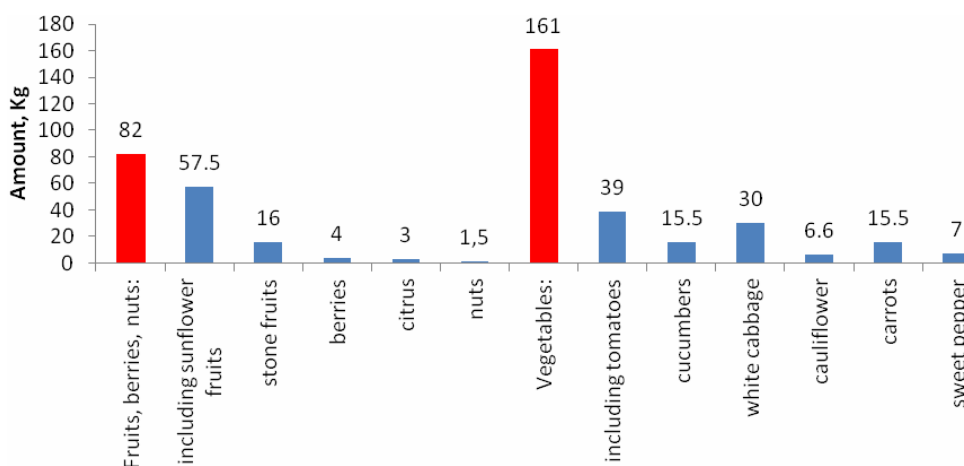


Fig. 2. The average annual consumption of fruits, berries, vegetables per adult, where carrots account for almost 10% of the volume of vegetables [10]

the form of residues. Given the trends of climate change, the author considers it appropriate to choose as the object of study one of the most water-intensive and popular vegetable crops – carrots (Fig. 2), considering it as a «living model».

Carrot roots [11–13] – are grown in all areas of Ukraine, occupying 1/5 of the sown area of vegetables (Fig. 3,a), and have exceptional nutritional value. Fresh roots – the content of dry soluble substances 12...13%, protein up to 1%, carbohydrates 3...12%. A fairly thick cover layer contains a lot of nutrients, but too little fiber, which with the existing means of mechanized harvesting and processing (Fig. 3,b) injures (mechanical – shaking and falling) and damages (air permeability – rapid withering) to almost 40 % of root crops. With significant resources for growing, harvesting and storage, up to 25% of the crop is lost. This season, the area of carrots has decreased the most, and some farmers have given up. Due to their biological characteristics, carrots are the most difficult crop to store. Storage is low even in state-of-the-art computer-controlled repositories.

The costs of maintaining the modern organizational and technical level and equipment for harvesting, transportation and storage of fruit and

vegetables are constantly growing [13–16]. Today it allows tripling the productivity of drip irrigation system. Twice reduces losses during transportation and storage of carrot roots creating technical storage conditions: the presence of darkness; air: temperature ± 1 °C, relative humidity 80...90%, CO₂ content 3...5%, O₂ content 9...10%, active ventilation 30...70 m³/t; layering (sand with a moisture content of 60...70% in the amount of 0.5 m³/t), clay or peat (dried skin protects against evaporation). But at the same time it is necessary to provide technical measures to protect against the development in storage of field diseases acquired during cultivation – rot white, gray, wet and dry (on damaged or injured roots at high humidity and temperature in storage); brown rot (growing on moist soil); black rot (periodic fluctuations in humidity and air temperature in storage).

Long-term preservation of carrots involves its preservation not only in the form of roots, but also in the form of carrots (sorted roots, sliced pieces, crushed powder, juice with pulp, dietary puree). Regardless of the involved production technology, a list of typical technological processes of raw material preparation (cleaning, inspection, calibration, sorting...) is mandatory, which are united by the



Fig. 3. The body and a fairly thick cover layer of carrots contain many nutrients (a. [11]), but insufficient mechanical strength with existing means of mechanized harvesting (b. [12])



Fig. 4. The body and a fairly thick cover layer of carrots contain many nutrients (a. [17]), but insufficient mechanical strength with existing means of mechanized harvesting (b. [13])



Fig. 5. Carrot juice with pulp or puree in foil containers (a. [21]) and carrot flour, which is easily digested in contrast to fresh carrots (b. [22])

common need for a significant amount of water for washing and repeated rinsing 1: 5 [13]. Technological processes of processing (blanching, squeezing, evaporation, drying...) determine the type of carrot product and simplify the requirements for long-term storage. In the manufacture of any product from carrots, which in the fresh state contains a lot of moisture (water up to 88% [13]), weight loss occurs mainly due to evaporation of water.

Carrot juice with pulp or puree – a common dietary and children’s food (well absorbed by the body and promotes the absorption of fats, proteins, carbohydrates). The main requirement for raw materials is the absence of rotten roots, as their presence gives the finished product an unpleasant taste and odor. Production of carrot juice with pulp – root washing, sorting, calibration, removal of inedible parts, grinding (particles are better somewhere 0.7 mm than colloidal), steaming or boiling (somewhere 10...20 minutes), rubbing (gradually sieves 0.7 and 0.4 mm), homogenization (with 10% sugar syrup in a ratio of 1:1, citric and ascorbic acids), packaging and sterilization (destruction of microflora, change of taste and aroma, softening of tissue, transformation and oxidation of substances, loss of vitamins). Much can be said about the benefits of carrot juice, but such a product [18], which contains sugar, citric acid, preservatives, dyes, artificial flavors, can not be called juice (it can be nectar or drink).

In this regard, more attractive is the juice obtained by restoring concentrated juice with drinking water in a ratio that ensures the preservation of physicochemical, microbiological, nutritional and organoleptic properties. Vegetable juices contain less organic acids and more minerals (potassium, sodium, calcium, iron). At first glance, it is most useful to use natural juices, but there are some limitations:

– vegetables and fruits lose a large amount of vitamins 6 hours after harvest, and 3...4 months after

harvest, the fruit remains one fiber;

– the stores sell attractive fruits, but it is likely that they can be genetically modified or grown with large amounts of fertilizers and chemicals;

– carrots, if bitten by mice, can be a source of pseudotuberculosis.

Direct-squeezed drinks in chilled form have a shelf life of up to 1 month. Pasteurized or sterilized have a shelf life of 6...24 months, as well as direct extraction in deep freezing to the state of ice agglomerates, but keeping at low temperatures and prolonged thawing significantly affects the cost of goods.

Implementation of the drying process involves the greatest loss of moisture (residue 7...12% [13]), which allows evaporated moisture to be considered as a significant amount in the implementation of technological processes of preparation for washing and rinsing (return as a distillate after cooling steam). There is a possibility of significantly reducing the need for water in the production of crushed powder, helping to reduce the shortage of drinking water, but also to simplify and reduce the cost of technology and reduce the cost and prolong long-term storage.

Dried carrot powder or flour (the rest of the bound moisture prevents the development of microflora and inactivates enzymes) [19,20] – a common food product for baking snacks, cookies, bread. The main requirements for raw materials are the absence of young, old or darkened roots. Production of dried carrot powder or flour – root crops washing, sorting, calibration, removal of inedible parts, grinding (particles somewhere 0.7 mm), blanching (almost ready – for 6...8 minutes at a temperature of 87...88°C), pressing cake is dried with frequent stirring in the air for 2 hours, the juice is extracted to obtain carotene), drying (drum or roller dryers to a humidity of 10...12%), grinding and packaging.

Carrot powder after long-term storage, almost

unlimited in time, can be diluted in portions with drinking water, by analogy with the above recovery technology. The undoubted advantage of producing carrot powder instead of concentrated juice should be considered not only 8...10 times less volume and less weight and the ability to save regardless of temperature whims. But the main advantage is probably not only the saving of drinking water when washing roots by attracting some of the squeezed liquid, but also the preservation of useful properties due to timely heat processing – to avoid the above restrictions on obtaining and consuming natural juice. The main disadvantage, probably, should be considered the relatively high hardness of carrot roots, which requires the search for special technical and technological solutions, which will ensure economic feasibility.

Of course, under modern conditions and also taking into account the forecast for the deterioration of the climatic situation, the usual evolutionary measures, significantly increasing the cost, becomes insufficient. Especially that the analysis of attitudes to innovation in the agricultural sector of Ukraine [21]:

1. Innovative solutions give efficiency in synergy, but are still implemented systematically. The information collected by the sensors is useless if the correct analysis is not performed and the results are not systematically interpreted. The findings will not be the basis for future decisions. Most farms now have control systems for fuel consumption and their own drones, which allow them to monitor the cultivation of fields, to obtain additional information, but few implement innovations systematically. Currently, the most obvious innovations on the market are fuel sensors and drones, as this is something that can be seen and partially presented to the market as its involvement in innovation.

2. So far, agricultural holdings prefer to invest in their own developments than to buy ready-made solutions from Ukrainian developers. During the negotiations, the companies present their product, talk in detail about its functionality, and in an hour it turns out that this agricultural company has begun to develop its own solution according to the same logic. Large companies are wary of transferring their data to external companies, even realizing that delegating certain functions or purchasing services may be cheaper and even more convenient. First, agricultural holdings usually underestimate the amount of investment. Second, ignore the fact that startups are compiling a large database, which makes their decision more viable.

3. There is money, but not enough to create a strong supply market. The world's largest agricultural companies spent \$9 billion on innovations, ie 2... 5% of turnover. In contrast, in Ukrainian companies this figure is about UAH 4 million in the market as a whole. This market has serious prospects – the only question is the readiness of agricultural companies for change. Innovations are not implemented not because of lack of money, but still because of lack of culture.

Conclusions

Thus, the development of the concept of «convenient food» involves not only the intensification and revision of existing functions, but also to change the perception of the organization of technological processes, which will: save drinking water when washing roots by attracting some squeezed liquid; to preserve useful properties due to timely warm processing; avoid the above restrictions on the production and consumption of natural juice. The relatively high hardness of carrots limits the economic feasibility. Under the current circumstances, sufficient favorable conditions have not yet been created for the development and implementation of innovations.

REFERENCES

1. «Klimatychnyj strajik» nazvale slovom roku za versieu slovnyku Collins [«Climate strike» was called the word of the year according to the dictionary Collins]. (n.d.). *hromadske.ua* Retrieved from <https://hromadske.ua/posts/klimatichnij-strajik-nazvali-slovom-roku-za-versiyeyu-slovnika-collins> [in Ukrainian].
2. Zmina klimatu ta sil'ske hospodarstvo v Ukraini: shcho varto nobility to farmers? [Climate change and agriculture in Ukraine: what should farmers know?]. (n.d.). *foodtecnology.info*. Retrieved from foodtecnology.info@apd-ukraine.de [in Ukrainian].
3. Stan basejnu Dnira faktyzhno katastrofizhnyj - vzhenni [The stan basinu Dnipro is actually catastrophic – chenni] (n.d.). *vsviti.com.ua*. Retrieved from <http://vsviti.com.ua/news/127596> [in Ukrainian].
4. Vegetarianstvo pomozhet ostanovit' ekologicheskij krizis, – issledovaniye [Vegetarianism will help stop the environmental crisis – research]. (n.d.). *bykvu.com/ru*. Retrieved from <https://bykvu.com/ru/bukvy/123960-vegetarianstvo-pomozhet-ostanovit-ekologicheskij-krizis-issledovanie/> [in Ukrainian].
5. Vitchyznyani fermery vidmovlyayut'sya vyroshchuvaty ovochi cherez brak volohy [Domestic farmers refuse to grow vegetables due to lack of moisture]. (n.d.). *kurkul.com*. Retrieved from <https://kurkul.com/news/27364-vitchiznyani-fermeri-vidmovlyayutsya-viroshchuvati-ovochoi-cherez-brak-vologhi> [in Ukrainian].

6. Bil'she m'yasa, menshe ovochiv ta fruktiv: yak zminylosya kharchuvannya ukraintyiv [More meat, less vegetables and fruits: how the diet of Ukrainians has changed]. (n.d.). *bykvu.com/ua*. Retrieved from <https://bykvu.com/ua/bukvy/bilshe-m-jasa-menshe-ovochiv-ta-fruktiv-jak-zminilosja-harchuvannja-ukraintyiv/> [in Ukrainian].
7. «Yizha — naykrashcha vaktsyna proty khaosu»: za shcho Vsesvitnya prodovol'cha prohrama otrymala «Nobelya» myru [«Food is the best vaccine against chaos»: why the World Food Program received the Nobel Peace Prize]. (n.d.). *hromadske.ua*. Retrieved from <https://hromadske.ua/posts/yizha-najkrashhava-kcina-proti-haosu-za-sho-vsivnitnya-prodovolcha-programa-otrimala-nobelya-miru> .
8. Produkty dorozhchayut' i tsinove rali tryvaye. Svit na porozhi prodovol'choyi kryzy? [Products are becoming more expensive and the price rally continues. Is the world on the verge of a food crisis?]. (n.d.). *epravda.com.ua*. Retrieved from <https://www.epravda.com.ua/publications/2021/11/8/679483/> [in Ukrainian].
9. Yak zберегти korisni vlastivosti ovochiv do vesni [How to preserve the beneficial properties of vegetables until spring]. (n.d.). *zorya.poltava.ua*. Retrieved from <http://zorya.poltava.ua/jak-zberegti-korisni-vlastivosti-ovochiv-do-vesni/> [in Ukrainian].
10. Naumenko, O.P., Zubenko, A.V., Kulinich, M.A., Naumenko, O.O., & Prokopenko, YU.YE. (2020). Obrannya morkvy u yakosti model'noyi syrovyny pry roz'hlyadi zasobu sukhooho bezkonservantnoho zberzhennya [Selection of carrots as a model raw material when considering a means of dry non-preservative storage]. *Mizhnar. nauk. internet-konf. «Informatsiyne suspil'stvo: tekhnolohichni, ekonomichni ta tekhnichni aspekty stanovlennya (vypusk 54)» / Zb. tez dop.: vypusk 54 (Ternopil', December 10, 2020).* — Chapter 2. — Ternopil'. pp. 85-86 [in Ukrainian].
11. Sytnykova N.O., Fomin K.F. Tekhnolohiya zberihannya i pererobky sil's'kogospodars'koyi produktsiyi [Technology of storage and processing of agricultural products] — K.: 2008. [in Ukrainian].
12. Vitchyznyani hospodarstva masovo skorochuyut' posivni ploshchi pid morkvoyu [Domestic farms are massively reducing sown areas under carrots]. (n.d.). *superagronom.com*. Retrieved from <https://superagronom.com/news/2301-vitchiznyani-gospodarstva-masovo-skorochuyut-posivni-ploshchi-pid-morkvoyu> [in Ukrainian].
13. Zberihannya morkvy vid A do YA (chastyna 1) [Storage of carrots from A to Z (part 1)]. (n.d.). *kurkul.com*. Retrieved from <https://kurkul.com/spetsproekty/461-zberigannya-morkvi-vid-a-do-ya-chastyna-1> [in Ukrainian].
14. Urozhaynist' morkvy za krapel'noho zroshennya zbil'shuyet'sya vtrychi [Yield of carrots under drip irrigation increases threefold]. (n.d.). *superagronom.com*. Retrieved from <https://superagronom.com/news/3588-urozhaynist-morkvi-za-krapelnogo-zroshennya-zbilshuyetsya-vtrych> [in Ukrainian].
15. Podpryatov, H.I., Rozhko, V.I., Skalets'ka, L.F. Tekhnolohiya zberihannya ta pererobky produktsiyi roslynnystva [Technology of storage and processing of crop products]: pidruchnyk. — K. : Ahrama osvita, 2014. [in Ukrainian].
16. Kombajnuvannya morkvi [Carrot harvester] (n.d.). *agrotimes.ua* Retrieved from <https://agrotimes.ua/article/kombajnuvannya-morkvi/> [in Ukrainian].
17. Hranenie perevozka ovoschey fruktov [Transportation of fruits and vegetables] (n.d.). Retrieved from <https://containers.ua/uk/articles/hranenie-perevozka-ovoschey-fruktov/> [in Ukrainian].
18. Chto takoe sok eto interesno poleznye svoistva soka [What's the point of SIK? Tse tsikavo. Corysni powervosti juice] (n.d.). Retrieved from <https://theroyalfamily.ru/uk/teplyjj-dom/chto-takoe-sok-eto-interesno-poleznye-svoistva-soka/> [in Ukrainian].
19. Morkvyanyy poroshok [Carrot Powder] (n.d.). *theroyalfamily.ru* Retrieved from <https://theroyalfamily.ru/uk/teplyjj-dom/chto-takoe-sok-eto-interesno-poleznye-svoistva-soka/> [in Ukrainian].
20. Sokovyzhymalka dlya morkvy [Juicer for carrots] (n.d.). *toolbox-site.com* Retrieved from <https://toolbox-site.com/19365-> [in Ukrainian].
21. Innovatsiyi abo imitatsiya 5 tez pro vprovadzhennya innovatsiy v agrosektori (video) [What's the point? Thesis about the promotion of innovation in the agricultural sector (video)] (n.d.). Retrieved from <https://landlord.ua/podii/innovatsiyi-abo-imitatsiya-5-tez-pro-vprovadzhennya-innovatsiy-v-agrosektori-video/> [in Ukrainian].

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ЕФЕКТИВНИЙ МАРКЕТИНГ РЕСУРСОЗБЕРІГАЮЧИХ ЕКОЛОГІЧНИХ ТЕХНОЛОГІЙ НА ХАРЧОВИХ ПІДПРИЄМСТВАХ

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За версією всесвітньо відомого словника «Collins English Dictionary» словом року вважається словосполучення «кліматичний страйк», яке у шорт-листі конкурувало з «надзвичайна кліматична ситуація», «кліматична криза», «екотривожність». Кліматичні зміни десятиліття вважають справжнім шоком суспільства не тільки України, а й світу в цілому. Всесвітня продовольча програма ООН, найбільша у світі гуманітарна організація, яка означена Нобелівською премією миру за проект «Їжа – найкраща вакцина проти хаосу». Однак світові ціни на продукти у 2021 році зросли на 32,8%. Причин до розкручування інфляції чимало: посухи; великий попит на зернові культури Китаю; експортні обмеження Росії; подорожчання нафти; закриті кордони та вплив робочої сили. У 2022 році аграрний сектор чекають нові випробування: подорожчання добрив (70...300%) та морських перевезень (300...500%); енергетична криза; завищений попит та політичні обмеження; кліматичні зміни. Враховуючи тенденції кліматичних змін авторський колектив вважає за доцільне обрати у якості об'єкта дослідження одну з найбільш водосмної у вирощуванні й затребуваної у вживанні овочевої культури – морква, розглядаючи її як «жива модель». Доволі товстий покривний шар містить багато поживних речовин, але замалу кількість клітковини, що за існуючих засобів механізованого збирання та обробки травмує та пошкоджує до 40% коренеплодів. При значних ресурсах на вирощування, збирання та зберігання до 25% врожаю втрачається. Морква – найскладніша культура щодо зберігання. Таким чином, розвиток концепції «Зручна їжа» передбачає не тільки інтенсифікацію та перегляд існуючих функцій, а й зміну уявлення відносно організації технологічних процесів, що надасть можливість: економити питну воду при митті коренеплодів завдяки залученню частини віджатої рідини; зберегти корисні властивості завдяки своєчасному тепловому переробленню; уникнути наведених вище обмежень до одержання і вживання натурального соку. Порівняно висока твердість моркви обмежує економічну доцільність. За існуючих обставин, поки не створено достатньо сприятливих умов до відпрацювання та впровадження інновацій.

Ключові слова: зручна їжа, економія ресурсів, корисні властивості, морквяний порошок.

ЭФФЕКТИВНЫЙ МАРКЕТИНГ РЕСУРСОСБЕРЕГАЮЩИХ ЭКОЛОГИЧЕСКИХ ТЕХНОЛОГИЙ НА ПИЩЕВЫХ ПРЕДПРИЯТИЯХ

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По версии всемирно известного словаря «Collins English Dictionary» словом года считают словосочетание «климатический страйк», которое в шорт-листе конкурировало с «чрезвычайная климатическая ситуация», «климатический кризис», «экотревожность». Климатические изменения десятилетия считают настоящим шоком общества не только Украины, но и мира в целом. Всемирная продовольственная программа ООН, наибольшая в мире гуманитарная организация, которая отмечена Нобелевской премией мира за проект «Еда – наилучшая вакцина против хаоса». Однако мировые цены на продукты в 2021 году выросли на 32,8%. Причин к раскручиванию инфляции много: засухи; большой спрос на зерновые культуры Китая; экспортные ограничения России; удорожание нефти; закрытые границы и отлив рабочей силы. В 2022 году аграрный сектор ожидают новые испытания: удорожание удобрений (70...300%) и морских перевозок (300...500%); энергетический кризис; повышенные ожидания и политические ограничения; климатические изменения. Учитывая тенденции климатических изменений авторский коллектив считает целесообразным выбрать в качестве объекта исследования одну из наиболее водопотребляемой в выращивании и востребованной в употреблении овощной культуры – морковь, рассматривая ее как «живая модель». Довольно толстый покрывный шар содержит много полезных веществ, однако малое количество клетчатки, что существующие средства механизированной уборки и обработки травмирует и повреждает до 40% корнеплодов. При значительных ресурсах на выращивание, уборку и хранение до 25% урожая теряется. Морковь – одна из сложных культур в хранении. Таким образом, развитие концепции «Удобная еда» предусматривает не только интенсификацию и пересмотр существующих функций, а и изменить представления относительно организации технологических процессов, что позволит: экономить питьевую воду при мойке корнеплодов посредством использования части отжатой жидкости; сохранить полезные свойства посредством своевременной тепловой переработки; избежать приведенных выше ограничений при получении и употреблении натурального сока. Относительно высокая твердость моркови ограничивает экономическую целесообразность. При существующих обстоятельствах пока не создано достаточно благоприятных условий к отработке и внедрению инноваций.

Ключевые слова: удобная еда, экономия ресурсов, полезные свойства, морковный порошок.

EFFECTIVE MARKETING OF ECOLOGICAL RESOURCE-SAVING TECHNOLOGIES AT FOOD ENTERPRISES

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According to the world-famous Collins English Dictionary, the word of the year is «climate strike», which in the shortlist competed with «climate emergency», «climate crisis», «eco-anxiety». Climate change of the decade is considered a real shock not only to Ukraine but to the world as a whole. The United Nations World Food Program, the world's largest humanitarian organization, has been awarded the Nobel Peace Prize for its project «Food is the best vaccine against chaos.» However, world food prices in 2021 increased by 32.8%. There are many reasons for the promotion of inflation: drought; high demand for grain crops in China; Russia's export restrictions; rising oil prices; closed borders and outflow of labor. In 2022, the agricultural sector will face new challenges: higher prices for fertilizers (70... 300%) and maritime transport (300... 500%); energy crisis; inflated demand and political constraints; climate change. Given the trends of climate change, the author's team considers it appropriate to choose as the object of study one of the most water-intensive in cultivation and in demand in the use of vegetable crops – carrots, considering it as a «living model». A fairly thick cover layer contains a lot of nutrients, but too little fiber, which with the existing means of mechanized harvesting and processing injures and damages up to 40% of roots. With significant resources for growing, harvesting and storage, up to 25% of the crop is lost. Carrots are the most difficult crop to store. Thus, the development of the concept of «Convenient food» involves not only the intensification and revision of existing functions, but also to change the perception of the organization of technological processes, which will: save drinking water when washing roots by attracting some squeezed liquid; to preserve useful properties due to timely warm processing; avoid the above restrictions on the production and consumption of natural juice. The relatively high hardness of carrots limits the economic feasibility. Under the current circumstances, sufficient favorable conditions have not yet been created for the development and implementation of innovations.

Keywords: convenient food, saving of resources, useful properties, carrot powder.

REFERENCES

1. «Klimatychnyj strajik» nazvane slovom roku za versieu slovnyku Collins [«Climate strike» was called the word of the year according to the dictionary Collins]. (n.d.). *hromadske.ua* Retrieved from <https://hromadske.ua/posts/klimatichnij-strajik-nazvati-slovom-roku-za-versiyeyu-slovnika-collins> [in Ukrainian].
2. Zmina klimatu ta sil'ske gospodarstvo v Ukraini: shcho varto nobility to farmers? [Climate change and agriculture in Ukraine: what should farmers know?]. (n.d.). *foodtecnology.info*. Retrieved from foodtecnology.info@apd-ukraine.de [in Ukrainian].
3. Stan basejnu Dnira faktyzhno katastrofizhnyj - vzheni [The stan basinu Dnipro is actually catastrophic – chenni] (n.d.). *vsviti.com.ua*. Retrieved from <http://vsviti.com.ua/news/127596> [in Ukrainian].
4. Vegetarianstvo pomozhet ostanovit' ekologicheskij krizis, – issledovaniye [Vegetarianism will help stop the environmental crisis – research]. (n.d.). *bykvu.com/ru*. Retrieved from <https://bykvu.com/ru/bukvy/123960-vegetarianstvo-pomozhet-ostanovit-ekologicheskij-krizis-issledovanie/> [in Ukrainian].
5. Vitchyznyani fermery vidmovlyayut'sya vyroshchuvaty ovochi cherez brak volohy [Domestic farmers refuse to grow vegetables due to lack of moisture]. (n.d.). *kurkul.com*. Retrieved from <https://kurkul.com/news/27364-vitchiznyani-fermeri-vidmovlyayutsya-viroshchuvati-ovochi-cherez-brak-volog/> [in Ukrainian].
6. Bil'she m'yasa, menshe ovochiv ta fruktiv: yak zminylosya kharchuvannya ukrajyntiv [More meat, less vegetables and fruits: how the diet of Ukrainians has changed]. (n.d.). *bykvu.com/ua*. Retrieved from <https://bykvu.com/ua/bukvy/bilshe-m-jasa-menshe-ovochiv-ta-fruktiv-jak-zminilosja-harchuvannja-ukrajinciv/> [in Ukrainian].
7. «Yizha — naykrashcha vaktsyna proty khaosu»: za shcho Vsesvitnya prodovol'cha prohrama otrymala «Nobelya» myru [«Food is the best vaccine against chaos»: why the World Food Program received the Nobel Peace Prize]. (n.d.). *hromadske.ua*. Retrieved from <https://hromadske.ua/posts/yizha-najkrasha-vakcyna-proti-haosu-za-sho-vsesvitnya-prodovolcha-programa-otrimala-nobelya-miru> .
8. Produkty dorozhchayut' i tsinove rali tryvaye. Svit na porozji prodovol'choyi kryzy? [Products are becoming more expensive and the price rally continues. Is the world on the verge of a food crisis?]. (n.d.). *epravda.com.ua*. Retrieved from <https://www.epravda.com.ua/publications/2021/11/8/679483/> [in Ukrainian].
9. Yak zberegiti korisni vlastivosti ovochiv do vesni [How to preserve the beneficial properties of vegetables until spring]. (n.d.). *zorya.poltava.ua*. Retrieved from <http://zorya.poltava.ua/jak-zberegiti-korisni-vlastivosti-ovochiv-do-vesni/> [in Ukrainian].

10. Naumenko, O.P., Zubenko, A.V., Kulnich, M.A., Naumenko, O.O., & Prokopenko, YU.YE. (2020). Obrannya morkvy u yakosti model'noyi syrovyny pry roz'hlyadi zasobu sukhoho bezkonservantnoho zberezheniya [Selection of carrots as a model raw material when considering a means of dry non-preservative storage]. Mizhnar. nauk. internet-konf. «Informatsiynе suspil'stvo: tekhnolohichni, ekonomichni ta tekhnichni aspekty stanovlennya (vyпуск 54)» / Zb. tez dop.: vypusk 54 (Ternopil', December 10, 2020). – Chapter 2. – Ternopil'. pp. 85-86 [in Ukrainian].
11. Sytnykova N.O., Fomin K.F. Tekhnolohiya zberihannya i pererobky sil's'kogospodars'koyi produktsiyi [Technology of storage and processing of agricultural products] – K.: 2008. [in Ukrainian].
12. Vitchiznyani hospodarstva masovo skorochuyut' posivni ploshchi pid morkvoyu [Domestic farms are massively reducing sown areas under carrots]. (n.d.). *superagronom.com*. Retrieved from <https://superagronom.com/news/2301-vitchiznyani-gospodarstva-masovo-skorochuyut-posivni-ploschi-pid-morkvoyu> [in Ukrainian].
13. Zberihannya morkvy vid A do YA (chastyna 1) [Storage of carrots from A to Z (part 1)]. (n.d.). *kurkul.com*. Retrieved from <https://kurkul.com/spetsproekty/461-zberigannya-morkvi-vid-a-do-ya-chastyna-1> [in Ukrainian].
14. Urozhaynist' morkvy za krapel'noho zroshennya zbil'shuyet'sya vtrychi [Yield of carrots under drip irrigation increases threefold]. (n.d.). *superagronom.com*. Retrieved from <https://superagronom.com/news/3588-uroжайnist-morkvi-za-krapel-nogo-zroshennya-zbilshuyetsya-vtrich> [in Ukrainian].
15. Podpryatov, H.I., Rozhko, V.I., Skalets'ka, L.F. Tekhnolohiya zberihannya ta pererobky produktsiyi roslыnnystva [Technology of storage and processing of crop products]: pidruchnyk. – K. : Ahrarna osvita, 2014. [in Ukrainian].
16. Kombajnuvannya morkvi [Carrot harvester] (n.d.). *agrotimes.ua* Retrieved from <https://agrotimes.ua/article/kombajnuvannya-morkvi/> [in Ukrainian].
17. Hranenie perezovzka ovoschey fruktov [Transportation of fruits and vegetables] (n.d.). Retrieved from <https://containers.ua/uk/articles/hranenie-perezovzka-ovoschey-fruktov/> [in Ukrainian].
18. Chto takoe sok eto interesno poleznye svoistva soka [What's the point of Sіk? Tse tsikavo. Corysni powervosti juice] (n.d.). Retrieved from <https://theroyalfamily.ru/uk/teplyjj-dom/chto-takoe-sok-eto-interesno-poleznye-svoistva-soka/> [in Ukrainian].
19. Morkvyanyy poroshok [Carrot Powder] (n.d.). *theroyalfamily.ru* Retrieved from <https://theroyalfamily.ru/uk/teplyjj-dom/chto-takoe-sok-eto-interesno-poleznye-svoistva-soka/> [in Ukrainian].
20. Sokovyzhymalka dlya morkvy [Juicer for carrots] (n.d.). *toolbox-site.com* Retrieved from <https://toolbox-site.com/19365-> [in Ukrainian].
21. Innovatsiyi abo imitatsiya 5 tez pro vprovadzhennya innovatsiy v agrosektori (video) [What's the point? Thesis about the promotion of innovation in the agricultural sector (video)] (n.d.). Retrieved from <https://landlord.ua/podii/innovatsiyi-abo-imitatsiya-5-tez-pro-vprovadzhennya-innovatsiy-v-agrosektori-video/> [in Ukrainian].