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O‘RNI” MAVZUSIDAGI XALQARO ILMIY VA ILMIY-TEXNIKAVIY
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PROSPECTS VEGETABLE CROPS CULTIVATION - ONIONS AND CARROTS IN THE REPUBLIC OF UZBEKISTAN

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Abstract. As a result of climate change, the reduction of water resources and the inability to fully meet the biological water requirements of agricultural crops may lead to decreased productivity and insufficient food supply for the growing population. Ensuring the cultivation of sufficient quantities of high-quality vegetable crops - particularly onions and carrots, which are considered staple foods in the daily diet of the population - is a great importance for maintaining the country’s food security. This article examines, based on field research and statistical data, the issues of ensuring sufficient production of strategically important vegetable products - onions and carrots - in the Republic of Uzbekistan, as well as the potential for exporting surplus products.

Keywords: population growth; food products; agriculture; agricultural products; onion; carrot; productivity; field studies; statistical data; export.

Аннотация. Иқлим ўзгариши натижасида сув ресурсларининг камайиб бориши, қишлоқ хўжалиги экинларининг сувга бўлган биологик талабини тўлиқ қондирилмаслиги натижасида ҳосилдорликни пасайиб кетиши, ўсиб бораётган аҳолини озиқ-овқат маҳсулотлари билан етарли таъминламасликка олиб келиши мумкин. Аҳолининг кундалик асосий озиқ-овқати ҳисобланган юқори сифатли сабзавот экинлари, пиёз ва сабзини етарли

миқдорда етиштириши, мамлакат озиқ-овқат хавфсизлигини таъминлашда муҳим аҳамиятга эга. Мақолада, дала тадқиқотлари ва статистик маълумотлардан фойдаланган ҳолда, Ўзбекистон Республикасида стратегик маҳсулот ҳисобланган пийёз ва сабзи қишлоқ хўжалиги маҳсулотларини озиқ-овқат билан етарли даражада таъминлаш, шунингдек ортиқча маҳсулотларни экспорт қилиш масалалари кўриб чиқилди.

Таянч сўзлар: аҳоли сонининг ўсиши; озиқ-овқат маҳсулотлари; қишлоқ хўжалиги; қишлоқ хўжалик маҳсулотлари; пийёз; сабзи; ҳосилдорлик; дала ўрганишлари; статистик маълумотлар; экспорт.

Introduction. Nowadays, ensuring food security of rapidly growing global population has become one of the world's most pressing challenges. Therefore, all countries around the globe, including the Organization of United Nations, have developed and implemented special programs aimed at improving food security [1]. Moreover, several laws and decrees concerning food security have also been adopted by the President of the Republic of Uzbekistan [2,3]. In addition, scientists of Uzbekistan Republic are actively conducting research in this direction [4,5].

For complete supply the population needs with high-quality food products, it is necessary to develop new high-yielding and drought-tolerant, disease resistant vegetable varieties, to fully meet the biological demand of crops for water, organic and mineral fertilizers, increase productivity, obtain 2–3 harvests per year from vegetable crops, and implement other relevant agricultural practices.

Methods and Materials. In Central Asian countries, particularly in Uzbekistan, due to population growth, the irrigated lands are expanding. Climate change, decreasing water resources due to retreating glaciers, becoming increasingly issue to fully supply the water needs of agricultural crops.

Predictions for the period between 2030 and 2050 include: a potential reduction of up to 50% of Central Asian glaciers [6]; a 10–15% decrease in Amu Darya's water flow, 6–10% in Syr Darya's flow; and an increase in agricultural water demand by 5% by 2030, 5–10% by 2050, and 12–16% by 2080 [7]. These changes could endanger the availability of drinking water and food products for the population.

One of the most reliable solutions to address water scarcity under climate change is the adoption of water-saving technologies across all sectors of the economy, including agriculture. Among these, today the drip irrigation has proven to be one of the most effective methods. Field experiments show that drip irrigation can save 40–50% of water on vegetable crops and 60–80% on orchards [8].

This article analyzes the importance of cultivating staple vegetables such as onions and carrots—key vegetable crops in the daily diet of the population—in ensuring national food security in Uzbekistan. The study is based on field observations and data from the State Statistics Committee of the Republic of Uzbekistan.

Results and discussion General information on onion and carrot production in the Republic of Uzbekistan. Globally, onions (*Allium cepa* L.) are cultivated on 4.444 million hectares, producing approximately 85.8 million tons, with an average yield of 19.31 tons per hectare. In Uzbekistan, onions are currently cultivated on 24,000 hectares, producing a total yield of 591,926 tons, with an average productivity of 25 tons per hectare [9, 11].

There are mainly Japanese and Spanish types of onions are grown.

- Japanese-type onions are mainly grown in Surkhandarya and Kashkadarya provinces, either by direct sowing or transplanting in August–September. The varieties of this type of onion yield an average of 30–40 tons per hectare due to low dry matter.

- Spanish-type onions are cultivated in nearly all regions of Uzbekistan. Planting usually occurs between December and March, with the growing period falling in early spring and summer, making these crops highly water-dependent. Average yields range from 45–65 tons per hectare.

Globally, carrots (*Daucus carota* L.) are grown on 1.1 million hectares, with a gross yield of 23.9 million tons. In 2021, carrots in Uzbekistan were cultivated on 57,000 hectares, producing 3,155.7 tons [10, 11].

In Uzbekistan, mainly **yellow and red** carrot varieties of the Chantney carrot type are grown. Depending on soil and climate conditions, carrots are sown during three seasons: **spring, summer,** and **late autumn as over wintering crop.**

- For early crop, carrot seeds are sown in southern regions starting from November 15 to December 15, in central regions from mid-February to 15, and in northern regions from late March to early April. And as summer carrots the seeds has been sown in the middle of July.

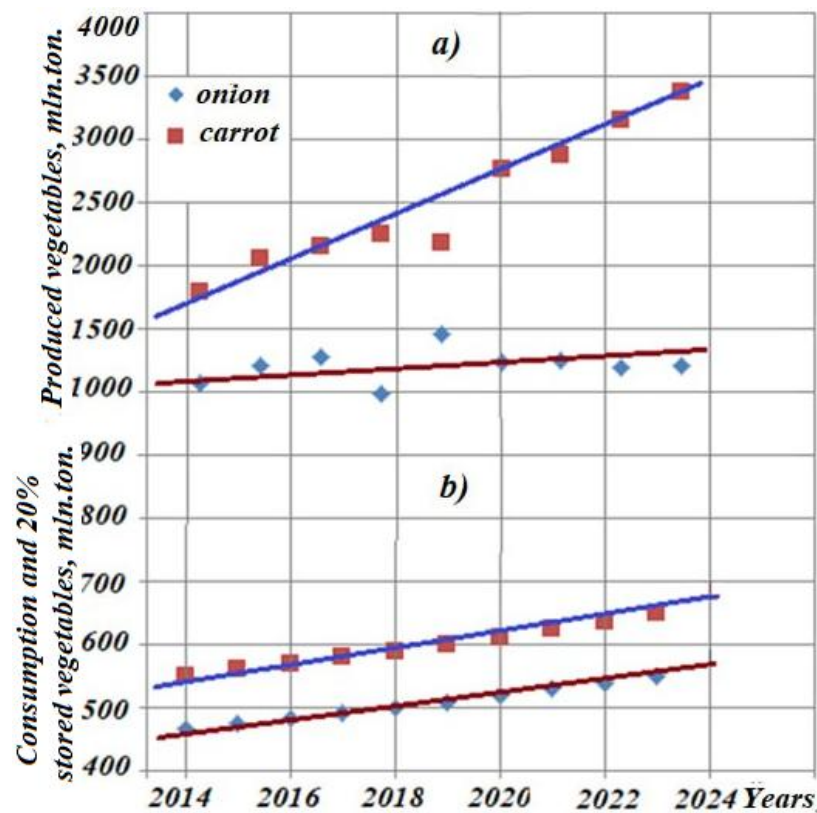
- The average yield is around 40–45 tons per hectare.

Based on ten years of data (2014–2023) from the State Statistics Committee of Uzbekistan on onion and carrot production (see Table 1), and corresponding graphical representations (Figure 1), the importance of these crops in ensuring food security has been analyzed [12, 13].

Table 1.

Information on the cultivation, consumption, and storage of Vegetables– onions and carrots – relative to population size

Year	Population, - mln.	⁴ Norm, kg/person x year		Consumption, ton/year		Storage (20%), ton		Consumption+ storage, ton		¹¹ Produced vegetables, mln. ton	
		onion	carrot	onion	carrot	onion	carrot	onion	carrot	onion	carrot
2014	30 222 994	12,9	15,2	389,9	459,4	78,0	91,9	467,9	551,3	1068,4	1791,5
2015	30 749 346			396,7	467,4	79,3	93,5	476,0	560,9	1206,6	2055,4
2016	31 284 568			403,6	475,5	80,7	95,1	484,3	570,6	1273,5	2149,9
2017	31 819 178			410,5	483,7	82,1	96,7	492,6	582,1	995,10	2249,7
2018	32 373 490			417,6	492,1	83,5	98,4	501,2	590,5	1464,5	2185,1
2019	32 964 701			425,3	501,1	85,1	100,2	510,3	601,3	1233,0	2768,6
2020	33 586 372			433,3	510,5	86,7	102,1	519,9	612,6	1256,1	2876,0
2021	34 243 696			441,8	520,5	88,4	104,1	530,1	624,6	1200,0	3155,7
2022	34 938 955			450,7	531,1	90,2	106,2	540,9	637,3	1214,3	3372,4
2023	35 652 307			459,9	541,9	92,0	108,4	551,9	650,3	1319,2	3451,2
Average	32783 561			422,9	498,3	84,6	99,7	507,5	598,2	1103,1	2605,6



Graphic 1. Yearly trends in the production and consumption of onion and carrot crops

a-produced vegetable crops; b-consumed and stored vegetable crops

To obtain high-quality and multiple harvests of vegetable crops—specifically onions and carrots—throughout the year, it is necessary to regionalize their cultivation based on the types and

varieties of the crops, soil characteristics of the farmland, climate conditions, the quality and availability of irrigation water, the level of groundwater, and other relevant factors. Additionally, in order to achieve high-quality and high-yield harvests of onions and carrots, special attention must also be paid to the quality of the seeds. The above analysis allows us to draw the following conclusions.

Conclusions.

1. The production of onion and carrot crops has increased in proportion to population growth:
 - Onion production reached **33.7 kg per person per year** (an increase of 2.6 times);
 - Carrot production reached **79.5 kg per person per year** (an increase of 5.2 times).
2. The quantity of crops produced compared to the amount which consumed:
 - Onion production was **2.6 times** higher than consumption;
 - Carrot production was **5.3 times** higher than consumption.
3. The total produced crops compared to the combined amount consumed and stored:
 - Onion production was **2.2 times** higher;
 - Carrot production was **4.4 times** higher.
4. There is a growing global demand for high-quality food products that meet international standards, including those produced in Uzbekistan.
5. The production of high-quality food products enables the country to adequately provide for its population, expand exports, and increase national foreign currency reserves.

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ЭФФЕКТИВНОСТЬ ИСПОЛЬЗОВАНИЯ БЫТОВЫХ СТОЧНЫХ ВОД ПРИ ВЫРАЩИВАНИИ КУЛЬТУРЫ ИНДИГОФЕРО.

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Аннотация. В данной статье рассматриваются такие вопросы, как поиск решений проблем, связанных с использованием бытовых сточных вод при выращивании культур Индигофера.

Ключевое слово: Индигофера, бытовые сточные воды, потребление удобрений, рентабельность, сточные воды, фильтрация, зеленый щит.

Abstract. This article covers issues such as finding solutions to problems related to the use of domestic wastewater in the cultivation of Indigofera crops.

Keywords: Indigofera, domestic wastewater, fertilizer consumption, profitability, groundwater, filtration, green shield.

Введение. В Постановлении Президента Республики Узбекистан от 24 октября 2023 года № PQ-343 «О сфере питьевого водоснабжения и водоотведения в Республике Узбекистан» определены приоритетные задачи по реформированию сферы питьевого водоснабжения и водоотведения. К этим задачам относятся такие вопросы, как учет питьевой воды, полная установка приборов учета воды, снижение потерь, цифровизация отрасли, обеспечение бесперебойного, качественного и безопасного обслуживания. Кроме того, в Постановлении от 1 августа 2023 года № KQ-547-IV определены меры по охране и рациональному использованию водных ресурсов. В данном постановлении отмечается, что из-за неисправностей в оросительных системах наблюдаются значительные потери воды при подаче воды на посевные площади и большое количество воды теряется при поливе в сельском хозяйстве. Эти общие документы связаны с рациональным использованием водных ресурсов и внедрением водосберегающих технологий и могут быть полезны при изучении возможностей использования бытовых сточных вод при выращивании индигоферы. Дефицит воды и охрана окружающей среды являются глобальными проблемами. Поэтому разработка стратегий эффективного использования воды в сельском хозяйстве является актуальной проблемой. Использование бытовых сточных вод при выращивании Индигоферы не только снижает дефицит воды, но и способствует снижению потребления минеральных удобрений за счет питательных веществ, содержащихся в сточных водах.

В вододефицитных, сильно засоленных районах Бухарской области поливная вода уменьшается с каждым годом, и для ее сохранения и экономии в условиях геометрически растущего населения, а также для предотвращения глобального потепления и стрессовых ситуаций одной из самых актуальных задач является поиск научно обоснованных путей улучшения мелиорации засоленных земель, экономии поливной воды и получения высококачественных урожаев за счет использования меньшего количества пресной воды и