Ukrainian Journal of Natural Sciences
№ 9
Український журнал природничих наук
№ 9

ISSN: 2786-6335 print
ISSN: 2786-6343 online

UDC 635.64.044:631.527.5:631.544.4»324»(292.486:477)]:338.31
DOI https://doi.org/10.32782/naturaljournal.9.2024.16

ECONOMIC EFFICIENCY OF CULTIVATION OF INDETERMINANT HYBRIDS OF CHERRY TOMATOES IN WINTER GREENHOUSES OF THE STEPPE AREA OF UKRAINE

V. L. Karachun[1], I. V. Lebedynskyi[2]

The article examines the economic efficiency of growing indeterminate hybrids of cherry tomatoes in winter greenhouses in the modern greenhouse complex of Dniprovskyi LLC. Experimental studies were conducted over three years (2021–2023). The research was carried out using indeterminate tomato hybrids: Juanita F_1 (control), DRC-564 F_1, DRC-2050 F_1, DRC-2055 F_1. The study determines the economic efficiency of growing, phenological observations, the dynamics of yield formation, and the marketability of hybrid fruits. Additionally, the effect of the hybrid on the main biochemical parameters of the fruits is presented, as well as the adaptation of hybrids to growing conditions in winter greenhouses.

The studies have shown a yield increase of 1.4 kg/m² to 1.9 kg/m², or a yield increase of 6.6% to 9.0%, on DRC-564 F_1, DRC-2050 F_1, and DRC-2055 F_1 compared to the control, Juanita F_1. By introducing these new cherry hybrids into crop rotation, it is possible to achieve a net profit increase per hectare of 3.3 million hryvnias for DRC-564, 2.5 million hryvnias for DRC-2055, and 2.3 million hryvnias for DRC-2050. The profitability of growing cherry tomatoes in winter greenhouses can reach 38.4% to 44.5%.

The obtained results provide valuable information for greenhouse plant growers regarding the selection of the most productive, economically beneficial, and adapted tomato hybrids for growing in winter greenhouses. This contributes to increased yield and economic efficiency.

Key words: *indeterminate, economic efficiency, cost price, winter greenhouses, net profit, technology, productivity, profitability.*

[1] Postgraduate student at the Department of Horticulture and Storage of Crop Products
(State Biotechnological University, Kharkiv)
e-mail: karachunvital@gmail.com
ORCID: 0009-0006-8525-2080
[2] Candidate of Agricultural Sciences, Associate Professor at the Department of Horticulture and Storage of Crop Products
(State Biotechnological University, Kharkiv)
e-mail: ivanleb1953@gmail.com
ORCID: 0000-0002-9245-5437

ЕКОНОМІЧНА ЕФЕКТИВНІСТЬ ВИРОЩУВАННЯ ІНДЕТЕРМІНАНТНИХ ГІБРИДІВ ПОМІДОРА ГРУПИ ЧЕРІ У ЗИМОВИХ ТЕПЛИЦЯХ СТЕПОВОЇ ЗОНИ УКРАЇНИ

В. Л. Карачун, І. В. Лебединський

У статті розглянуто економічну ефективність вирощування індетермінантних гібридів помідора групи чері, вирощених у зимових теплицях в сучасному тепличному комплексі ТОВ ТК «Дніпровський». Експериментальні дослідження проводили протягом трьох років (2021–2023 рр.). Дослідження виконували з індетермінантними гібридами помідора: Хуаніта F_1 (контроль), DRC-564 F_1, DRC-2050 F_1, DRC-2055 F_1. Дослідження визначає економічну ефективність вирощування, фенологічні спостереження, динаміку формування врожайності та товарність плодів гібридів. Одночасно представлений вплив гібрида на основні біохімічні показники плодів, а також пристосування гібридів до умов вирощування в зимових теплицях.

Дослідження показали приріст урожайності на DRC-564 F_1 DRC-2050 F_1 DRC-2055 F_1 порівняно з контролем Хуаніта F_1 від 1,4 кг/м² до 1,9 кг/м², або приріст врожайності на рівні 6,6–9,0%. При впровадженні в культурозміну нових гібридів чері можна отримати приріст чистого прибутку з гектару на гібридах DRC-564 3,3 млн. грн. га, DRC-2055 2,5 млн. грн. га, DRC-2050 2,3 млн. грн. га. Рівень рентабельності вирощування помідора групи чері в зимових теплицях можна отримати на рівні від 38,4% до 44,5%.

Отримані результати надають цінну інформацію для тепличних комбінатів щодо вибору найбільш продуктивних економічно вигідних та пристосованих гібридів помідора для вирощування в зимових теплицях, сприяючи підвищенню врожайності та економічної ефективності.

Ключові слова: *індетермінантний, економічна ефективність, собівартість, зимові теплиці, чистий прибуток, технологія, урожайність, рентабельність.*

Introduction

The main task of the indoor vegetable growing industry at the current stage is to provide the population of Ukraine with a variety of vegetable products all year round and make it possible to obtain the largest harvest from a unit of area (Cherneshenko et al., 2018).

Tomatoes have a rich history and are common in many countries. Tomato fruits are the most valuable for humans among all types of vegetables (Yarovyi & Romanov, 2017). Their exclusive benefit lies in the fact that they contain various proteins, sugars, organic acids, vitamins, and minerals necessary for better metabolism, contribute to increasing appetite, and maintaining human performance. The wide range of tomato distribution is explained by its high taste and nutritional qualities (Chernyshenko et al., 2017).

The largest tomato producers in the world are China, Mexico, Italy, Spain, and the USA. According to FAO (in 2019), tomatoes ranked first in the world among fruit and vegetable plants (4 million hectares), including in protected soil (60% of the entire area). In 2019, the largest number of tomatoes was grown in China – more than 1 million hectares (67.76 million tons), in India – 520 thousand hectares (19 million tons), Turkey – 225 thousand hectares (12.84 million tons), Egypt – 200 thousand hectares (6.75 million tons), the USA – 200 thousand hectares (10.86 million tons), Italy – 5.25 million tons, Iran – 5.24 million tons. In 2019, 158.4 million tons of tomatoes were produced in the world. It is noted that the production of tomato fruits increases by 3% every year (Лебединський і Карачун, 2022).

The volume of tomato trade in EU countries (fresh and frozen fruits) is 2 billion euros. According to world international statistics, there are more than 140 categories of vegetable plants on the market, and tomato fruits are the most sold. In this volume, the lion's share falls on tomato fruits – more than 50% in fresh form and about 50% in processed form. In terms of world production, tomato fruits in the Netherlands make up 1%, in Spain – 4%, in Italy and Egypt – 6%, in Turkey – 8%, in the USA and China – 15% (Жук та ін., 2014).

About 2.44 million tons of tomato fruits were grown in Ukraine in 2022, with 0.23 million tons directly in closed soil structures. In Ukraine, tomatoes are grown on a total area of 75.8 thousand hectares, of which about 3 thousand hectares are in closed soil structures. The area of industrial glass greenhouses in Ukraine, which work according to modern technologies, is 300 hectares, of which 170 hectares are used for professional tomato cultivation in winter greenhouses (Лебединський і Карачун, 2022).

Having familiarized myself with the literary sources, it became known that growing tomatoes in winter greenhouses is a fairly profitable area of agribusiness, as it provides the maximum income from the area under the conditions of compliance with the technology of intensive cultivation and favorable market conditions.

The cost structure for growing tomatoes for eleven months with fruiting in nine months in modern winter greenhouses is about 75.2–85.3% of direct material costs, namely: 30.1–35.1% for energy (natural gas, coal, biofuel, wood chips, electricity); 30.4–35.7% for labor costs and taxes (18.0% personal income tax, 22.0% single social contribution); raw materials and materials for cultivation occupy 13.1–16.2% of the cost price (mineral fertilizers 5.1–7.2%, substrates 3.1–4.2%, seeds 2.1–4.1%, plant protection means 0.9–1.9%, agrotechnical materials 0.3–0.5%, pollination materials 0.3–0.5%). Additional material costs for production are divided into: pre-sale preparation costs 5.0–9.4% (packaging, sorting, transportation, marketing), fixed costs 1.1–3.8% (fuel and lubricants, repairs), other expenses 5.1–7.2% (depreciation, rent, etc.) (Карачун, 2024 a).

The use of different technologies in the cultivation of tomatoes leads to a difference in cost, level of profitability, production costs and, ultimately, productivity per unit area. The introduction of new elements into the technology of growing tomatoes in winter greenhouses helps to increase the efficiency of production and ensures the ecological safety of vegetable products, which is possible only in a modern greenhouse complex for small-scale hydroponics (Кисляченко, 2013).

Cherry tomatoes imported from the EU, Egypt, Turkey, and other countries are mainly sold in the Ukrainian market and supermarkets. The upward trend in the price of finished cherry tomato products has remained fairly stable over recent years, which is positive for the market and the producers' economy. Currently, producers still grow many large-fruited tomatoes, but this direction is oversaturated, so the popularity of cherry tomatoes is growing rapidly in the Ukrainian market. Demand is high and a lot of effort is being directed to further increase production. For example, in modern greenhouse plants, various hybrids of cherry tomatoes are constantly being studied for further introduction into production (Карачун, 2024 b).

Material and methods

The purpose of the experiment is to determine the economic efficiency of growing indeterminate hybrids of the cherry tomato group in winter greenhouses.

Taking into account the constant increase in the assortment of tomatoes available in Ukraine, certain aspects of substantiating the characteristics of cherry tomato hybrids and the economic aspects of growing cherry tomatoes remain insufficiently studied and are quite relevant at the current stage.

The research was conducted in modern block hydroponic winter greenhouses of the «Venlo» type at the modern enterprise of Dniprovskyi TC LLC, which is located in the Dnipro district, Dnipropetrovsk region. All processes in the greenhouses were automated, with computer regulation of the microclimate and the use of drip irrigation during 2021–2023. Indeterminate hybrids of the cherry group from the Dutch manufacturer, Monsanto, with similar biological characteristics and qualitative indicators, such as: early maturity (beginning of fruiting in 95–100 days), fruit weight (20–35 grams), high marketability, recommended planting density, were selected for the study. 18–25 thousand plants per hectare, the plant develops in a balance between vegetative and generative types of development. The following hybrids were studied: Juanita (control), DRC-564, DRC-2050, DRC-2055.

The placement scheme of the experiment options is systematically regular in four repetitions. The area of the accounting plot is 10 m², the total area of the plot is 14 m², the total area of the experiment is 224 m². Seedlings were grown according to the classical scheme in 35 days and planted in a permanent place in the phase of 9–11 true leaves. Scheme of placement of plants, four plants per mineral wool substrate «Hrodan Master» (100 x 20 x 7.5 cm), the volume of the substrate under one plant is 3.75 liters. The density of plants is 25 thousand per hectare, with a further increase in density to 31 thousand stems per hectare, and a final increase to 37 thousand stems per hectare. The number of plants in the accounting area is 25 pcs.

After the seedlings were planted in the greenhouse at a permanent place of cultivation, the care of the plants was carried out according to the technology of growing in the greenhouse. Tomato harvest was carried out in the months of fruiting (March, April, May, June, July, August, September, October,

November) three times a week according to DSTU 3246-95 «Fresh Tomato». Accounting and observation in the experiment were carried out according to generally accepted methods in accordance with the «Research case in agronomy» (2016) and according to the «Methodology of the research case in vegetable growing and melon growing» (2001). Economic efficiency was calculated based on the value of the harvest and additional costs for obtaining its increase from each option according to actual costs (Болотських і Довгаль, 1999).

Results and discussion

During the phenological observations from 2021 to 2023, the following findings were made. The sowing of tomato hybrids in 2021–2023 took place in the second week of December, which is the optimal sowing period for winter greenhouses, considering the greenhouse's climatic zone. On the third day, all hybrids showed a single emergence of seedlings, and more than 75% of the seedlings had sprouted by the fifth day after sowing. This can be attributed to the optimal microclimate in the seed germination chamber, with a substrate temperature of 25°C and a relative humidity of 90%.

The appearance of the third leaf was observed earlier in the DRC-564 and DRC-2055 hybrids, on the tenth day after sowing, while in the DRC-2050 hybrid, it appeared on the twelfth day. In the Juanita hybrids (control group), the third leaf appeared on the eleventh day after sowing. All tomato hybrids were transplanted into mineral wool cubes for a period of 14 days after sowing.

The seedlings were arranged in the seedling block ten days after transplanting. The planting of seedlings in the greenhouse's permanent location was done on the 35th day after sowing. The seedlings were uniform in the Juanita (control) and DRC-564 hybrids, with a well-formed first panicle. In the DRC-2050 and DRC-2055 hybrids, the tassel moved away from the stem 39 days after emergence. The first fruits appeared on all hybrids 41–43 days after germination.

To increase the density of tomato plants to 3.1 plants per square meter (31,000 plants per hectare), an additional stem was planted in the first week of March, on average over three years. The density was further increased to 3.7 plants per square meter (37,000 plants per hectare) a month later, in the first week of April.

The harvesting of tomato fruits began earliest in the DRC-564 and DRC-2055 hybrids, at the end of the second week of March, 94 days after germination. The Juanita (control) and DRC-2050 hybrids started bearing fruit at the beginning of the third week of March, 97 days after germination. All hybrids entered mass fruiting at the end of the third week of March.

The removal of tops and growth points in all hybrids was done simultaneously on September 15, 8 weeks (55 days) before the final fruit collection.

The death of plants in all hybrids was observed simultaneously on November 15.

In the 2021–2023 studies, tomato plants bore fruit on average for 227 to 230 days. Figure 1 illustrates the yield for each month of fruiting (March, April, May, June, July, August, September, October, November).

The highest rate of early harvest (on May 1) on average for 2021–2023 was characterized by hybrid DRC-564 – (3.16 kg/m²), which is 0.74 kg/m², 30.71% more than the control. Hybrids DRC-2050 and DRC-2055 were almost at the same level in terms of early harvest. Accordingly, DRC-2050 F1 provided a yield of 3.04 kg/m², which is 0.62 kg/m², 20.35% more than the control. DRC-2055 F_1 yielded 3.08 kg/m², which is 0.66 kg/m², 21.34% more than the control. The lowest rate of early harvest was in the Juanita F_1 control and averaged 2.42 kg/m² over three years (Table 1).

Juanita F1 (control) provided an average total yield of 21.21 kg/m²for 2021–2023 (Table 2). The highest yield was obtained on the DRC-564 hybrid, it was 23.12 kg/m², which is 9.0% or 1.91 kg/m²more than the control.

Hybrid DRC-2055 produced a yield of 22.65 kg/m², which is 6.88% or 1.46 kg/m² more than the control. The DRC-2050 hybrid produced a yield of 22.65 kg/m², which is 6.76% or 1.43 kg/m² more than the control. Having analyzed the yield of tomatoes for the three years 2021-2023, the following conclusions can be drawn that the yield of indeterminate cherry tomato hybrids was at the level of 21.21 kg/m² to 23.12 kg/m² (Table 2).

The highest marketability was shown by the DRC-564 hybrid, which was equal to 97.09%, which is 1.49% more than the control. Juanita F1 (control) showed the lowest marketability within 95.95% (Table 3).

Analyzing the marketability of tomato fruits of indeterminate hybrids of the cherry group for 2021–2023, we made the following conclusions that when growing new promising hybrids, an increase in marketability can be obtained at the level of 0.29% to 1.56%.

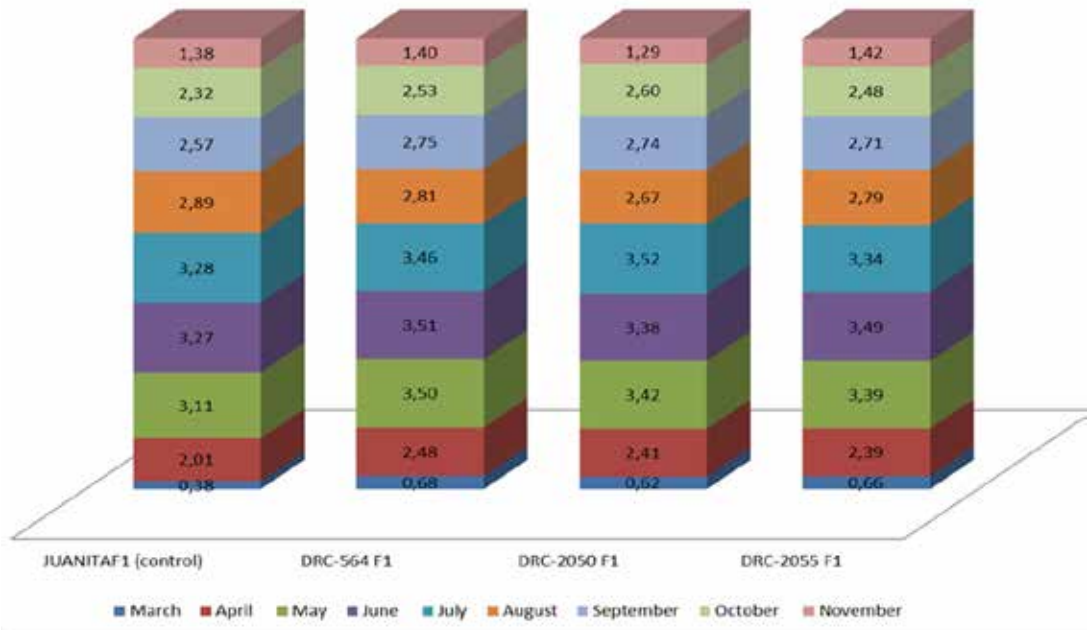

Fig. 1. Yield dynamics of cherry tomato hybrids per month, kg/m²

Table 1

Formation of an early harvest (on May 1) of cherry tomato fruits 2021–2023

Hybrid	Yield, kg/m²				Increased yield	
	2021	2022	2023	average yield	kg/m²	%
Juanita (control)	2,64	2,37	2,25	2,42	0,00	0,0
DRC-564	3,17	3,21	3,10	3,16	0,74	30,71
DRC-2050	3,02	3,00	3,09	3,04	0,62	20,35
DRC-2055	3,19	2,84	3,19	3,08	0,66	21,34
NIR, 05 kg/m²	0,25	0,33	039			

Table 2

The total yield of cherry tomato hybrids for 2021–2023

Hybrid	Yield, kg/m²				Increased yield	
	2021	2022	2023	average yield	kg/m²	%
Juanita (control)	21,35	21,06	21,23	21,21	-	-
DRC-564	23,11	22,58	23,67	23,12	1,91	9,00
DRC-2050	22,76	22,28	22,89	22,65	1,43	6,76
DRC-2055	22,60	22,39	23,03	22,67	1,46	6,88
NIR, 05 kg/m²	0,64	0,61	084			

Table 3

Marketability of cherry tomato hybrids for 2021–2023

Hybrid	Marketability, %				Increase in marketability
	2021 p.	2022 p.	2023 p.	average marketability	%
Juanita (control)	94,75	95,11	96,91	95,59	0,00
DRC-564	96,42	97,55	97,28	97,09	1,49
DRC-2050	96,17	94,25	97,18	95,87	0,27
DRC-2055	95,65	96,25	97,04	96,31	0,72
NIR, 05%	0,35	0,44	0,51		

According to the results of the assessment of the economic efficiency of growing ideterminant hybrids of the cherry tomato group in winter greenhouses, it was established that the full cost of cultivation is quite high and was at the level of 1813.1 hryvnias/m² to 1824.1 hryvnias/m² (Table 4). The lowest total cost was in Juanita F1 (control) and amounted to UAH 1,813.1/m². The highest cost price was UAH 1,824.1/m² in the DRC-564 hybrid, which is UAH 11.0/m² higher than the control. In DRC-2050 F1, the cost price was UAH 1,818.9/m², which is UAH 5.8/m² higher than the control. Hybrid DRC-2055 had a cost price of UAH 1,821.7/m², which is UAH 8.6/m² higher than the control.

The full cost of cultivation is divided into such basic costs as: basic costs of energy carriers, basic costs of wages, basic costs of raw materials and materials, costs of packaging, logistics, marketing, fixed costs, other costs (Fig. 2.) Basic costs of energy carriers (natural gas, biofuel, electricity), this indicator is UAH 561.1/m², 30.7-30.1% of the total cost, is the same for all hybrids because the same microclimate was maintained in the winter greenhouse for all hybrids (Table 4). Basic labor costs were the lowest in the hybrid Juanita (control) and amounted to UAH 614.2/m². Basic labor costs were the highest in hybrid DRC-564 and amounted to 619.5 hryvnias/m², which is 5.3 hryvnias/m² higher than the control.

Basic labor costs were the lowest in the hybrid Juanita (control) and amounted to UAH 614.2/m². Basic labor costs were the highest in the DRC-564 hybrid and amounted to UAH 619.5/m², which is UAH 5.3/m² higher than the control. In the DRC-2050 and DRC-2055 hybrids, the basic wage costs were 618.4-618.9UAH/m², which is 4.2-4.7UAH/m² higher than the control. But the increase in basic wage costs in the amount of 4.2 to 5.3 hryvnias/m² is explained by the impact due to the increase in the yield of hybrids DRC-564, DRC-2050, DRC-2050 from 1.4 to 1.9 kg/m². Basic wage costs in our full cost structure occupy from 33.9 to 34.0% (Table 4).

When growing indeterminate cherry tomato hybrids according to the method and growing technology, everything was done simultaneously and at the same time for all hybrids (planted plant stand density, watering, plant nutrition, the same substrates, microclimate, plant nutrition and stimulation, protection of plants from pests and diseases), basic costs for raw materials and materials for all hybrids were at the level of UAH 308.4/m², which in turn amounts to 16.9 to 17.0% of the total cost.

Table 4

Economic efficiency of cherry tomato cultivation for 2021–2023

Indicator	*Variant*			
	Juanita (control)	**DRC-564**	**DRC-2050**	**DRC-2055**
Yield, kg/m²	21,21	23,12	22,65	22,67
Marketability, %	95,3	97,2	96,2	96,6
Yield increase, kg/m²	0,0	1,9	1,4	1,5
Increase in marketability, %	0,0	1,9	0,8	1,3
Yield from UAH /m²	2942,3	3285,6	3182,1	3201,9
Basic energy costs, UAH /m²	561,1	561,1	561,1	561,1
Basic expenses for wages, UAH /m²	614,2	619,5	618,4	618,9
Basic costs for raw materials and materials, UAH/m²	308,4	308,4	308,4	308,4
Costs for packaging, logistics, marketing, UAH/m²	168,5	174,2	170,1	172,4
Fixed costs, UAH/m²	62,1	62,1	62,1	62,1
Other expenses, UAH/m²	98,8	98,8	98,8	98,8
Total production costs, UAH/m²	1483,7	1489,0	1487,9	1488,4
Full cost, UAH/m²	1813,1	1824,1	1818,9	1821,7
Notional net profit, UAH/m²	1129,2	1461,5	1363,2	1380,2
The level of profitability, %	38,4	44,5	42,8	43,1

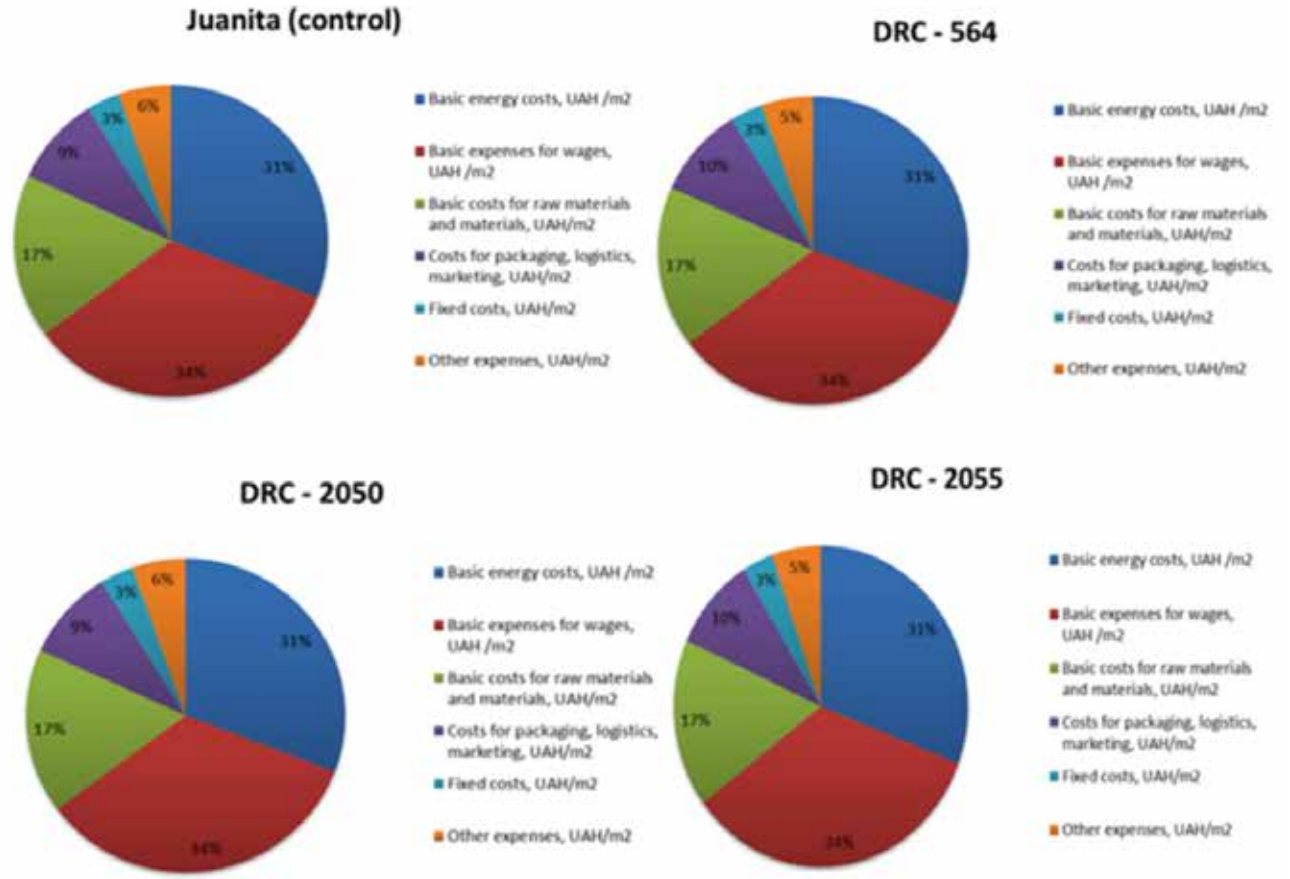

Fig. 2. The full cost of growing cherry tomato hybrids on average in 2021–2023

When growing indeterminate cherry tomato hybrids according to the method and growing technology, everything was done simultaneously and at the same time for all hybrids (planted plant stand density, watering, plant nutrition, the same substrates, microclimate, plant nutrition and stimulation, protection of plants from pests and diseases), basic costs for raw materials and materials for all hybrids were at the level of UAH 308.4. /m², which in turn amounts to 16.9 to 17.0% of the total cost.

Basic costs of raw materials and materials are divided into such categories of costs as: mineral fertilizers, seeds, substrates, plant protection products, pollination materials, agrotechnical materials. Figure 3 deciphers the basic costs of raw materials and shows how much percentage of the basic costs of raw materials and materials is taken by which indicator.

Costs for packaging, logistics and marketing were the lowest in Juanita F1 (control) and amounted to UAH 168.5/m², the highest figure was in DRC-564 F1, which was UAH 174.2/m², which is UAH 5.7/m², higher than the control. In hybrids DRC-2050 and DRC-2055, costs for packaging, logistics and marketing amounted to UAH 170.1-172.4/m², which is 1.6-3.9 UAH/m² higher than the control. This increase in costs for packaging, logistics and marketing in the range from 1.6 to 5.7 hryvnias/m² is explained by the effect of higher yields of hybrids DRC-564, DRC-2050, DRC-2050 from 1.4 to 1.9 kg/m² compared to the control Costs for packaging, logistics and marketing in our structure of full cost occupy from 9.3 to 9.5% (Table 4).

The indicator of fixed costs for all studied hybrids of the cherry group is at the level of UAH 52.1/m², and is 3.4% of the total cost. Fixed costs include costs for fuel and lubricants and repairs (Table 4). Other expenses account for 5.4%, or UAH 98.8/m², of the cost price of all studied hybrids of the cherry group. The category of other expenses includes expenses for depreciation, rent taxes, dividends, and social expenses (Table 4).

Profitability indicator UAH/m² for the cultivation of promising cherry hybrids was at the level of 2942.3 to 3285.6 UAH/m². The lowest rate of yield was noted on the control of Juanita F1 2942.3 hryvnias/m². DRC-564 F1 was marked with the highest rate of

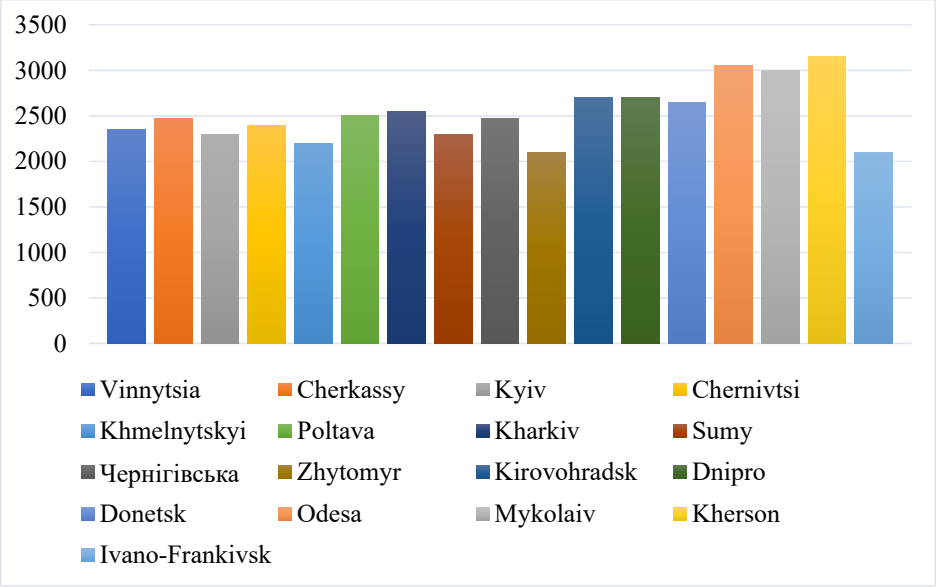

Fig. 3. Basic costs for raw materials and materials in 2021–2023

profitability, it amounted to UAH 3,285.5/ m², which is 343.2 UAH/m², or 11.7% higher than the control. In hybrids DRC-2050 and DRC-2055, this indicator was 3182.1 and 3201.9 UAH./m², which is 239.8 UAH/m² and 259.6 UAH /m², or 8.2 and 8.8% higher than the control (Table 4).

Conditionally net profit from m² under the control of Juanita F1 was UAH 1129.2/m². The highest rate of net profit was noted in DRC-564 F1, it amounted to UAH 1,461.5/m², which is 343.2 UAH /m², or 30.4% higher than the control. DRC-2055 F1 net profit was 1,380.2. UAH /m², which is 251.0 UAH /m², or 22.2% higher than the control. Hybrid DRC-2050 net profit was UAH 1,363.2./m², which is 234.0 UAH / m², or 20.7% higher than the control (Table 4).

The level of profitability of growing cherry tomatoes in winter greenhouses on average for 2021-2023 ranged from 38.4% in the Juanita F1 control to 44.5% in DRC-564 F1. In the hybrid DRC-2055 F1, the level of profitability was 43.1%, and in DRC-2050 F1, it was 42.8% (Table 4).

Conclusions

The following conclusions were drawn during the research on promising indeterminate hybrids of the cherry tomato group, conducted from 2021 to 2023.

1. Phenological observations confirmed the accurate implementation of technological maps in winter greenhouses, with no deviations in the timing of plant growth. The data are similar to three years ago, when the greenhouse plants were planned for cultivation for two to four years.

2. The yield of the studied cherry tomato hybrids DRC-564 F1, DRC-2050 F1, and DRC-2055 F1 showed an increase in yield compared to the control hybrid Juanita. The studies showed an increase in yield from 1.4 kg/m² to 1.9 kg/m², or at the level of 6.6% to 9.0%. The DRC-564 F1 hybrid showed the highest yield increase of 1.9 kg/m², or 9.0%.

3. Analysis of the marketability of tomato fruits from the cherry tomato hybrids for 2021–2023 showed that it is possible to achieve an increase in marketability ranging from 0.29% to 1.56%. The DRC-564 hybrid showed the best marketability at 97.2%, which is 0.6% higher than the control.

4. The total cost of growing indeterminate hybrids of the cherry group ranged from 1813.1 to 1824.1 UAH/m². The productivity and marketability of tomatoes directly affect the increase in the cost price, due to wages, packaging, logistics, and marketing costs. The total cost of growing the control hybrid Juanita F1 was UAH 1,813.1/m². The highest cost price was UAH 1,824.1/m² for the DRC-564 hybrid, which is UAH 11.0/m² higher than the control. The cost price for DRC-2050 F1 was UAH 1,818.9/m², which is UAH 5.8/m² higher than the control. Hybrid DRC-2055 had a cost price of UAH 1,821.7/m², which is UAH 8.6/m² higher than the control.

5. When introducing new promising cherry hybrids into crop rotation, a net profit of UAH 1,461.5/m² was obtained for DRC-564 F1,

which is 343.2 UAH/m², or 30.4% higher than the control. The net profit for DRC-2055 F1 was UAH 1,380.2/m², which is 251.0 UAH/m², or 22.2% higher than the control. The net profit for hybrid DRC-2050 was UAH 1,363.2/m², which is 234.0 UAH/m², or 20.7% higher than the control.

6. The level of profitability in growing cherry tomatoes in winter greenhouses ranged from 38.4% to 44.5%. The highest level of profitability was achieved with the DRC-564 hybrid at 44.5%, which is 6.1% higher than the control hybrid Juanita.

Therefore, based on the conducted research, it was established that the cherry tomato hybrids DRC-564, DRC-2050, and DRC-2055 significantly outperform the control hybrid Juanita in terms of various indicators and can be considered for cultivation in winter greenhouses for extended crop rotation.

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Отримано: 22.07.2024
Прийнято: 13.08.2024