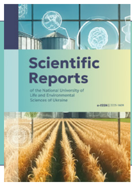
Received 16.10.2024 Revised 13.01.2025 Accepted 27.02.2025

Vol. 21, No. 1
2025



Scientific Reports of the National University of Life and Environmental Sciences of Ukraine

Journal homepage: https://scireports.com.ua/en

UDC 635.649: 631.529

DOI: 10.31548/dopovidi/1.2025.90

Effectiveness of shading sweet pepper for growing in the Forest-Steppe of Ukraine

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Abstract. The purpose of the study was to establish the influence of shading grids of different densities on the growth, development and productivity of sweet pepper plants under irrigation conditions of the Left-Bank Forest-Steppe of Ukraine. The study was carried out at the Institute of Vegetable and Melon Growing of the National Academy of Agrarian Sciences of Ukraine according

Suggested Citation:
Kuts, O., Pylypenko, L., Rozhkov, A., Semenenko, I., & Hulyak, N. (2025). Effectiveness of shading sweet pepper for growing in the Forest-Steppe of Ukraine. *Scientific Reports of the National University of Life and Environmental Sciences of Ukraine*, 21(1), 90-102. doi: 10.31548/dopovidi/1.2025.90.

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to generally accepted methods using the field research method. The implementation of the research provided for determining the impact of the introduction of shading plants with grids with a density of 45% and 60% on biometric parameters and productivity of sweet pepper plants, economic indicators of cultivation efficiency. It was found that shading provides a significant increase in the diameter of sweet pepper plants for both varieties (by 15.1-23.7%), and only for the Liubasha variety – an increase in plant height (by 17.8-21.5%) and fruit height (by 10.1-15.2%). Shading using a grid with a density of 45% provides a significant increase in the number of fruits on the plant for both varieties (by 11.5% for the Liubasha variety and by 48.5% for the Svitozar variety). Increasing the density parameter of shading nets to 60% leads to a decrease in the number of fruits on plants. It was noted that for the Liubasha variety, the growth of the average fruit weight when using shading is 11.1-25.6%, for the Svitozar variety, this indicator decreases by 17.9-60.2%. A significant increase in the yield of sweet pepper was provided by the use of shading with a grid with a density of 45% only for the Liubasha variety (an increase of 24.3%). According to this technological approach, the economic parameters of growing sweet pepper are increased (profit up to 14.75 UAH/m2, profitability up to 103%). The results of the study may be useful for small and medium-sized farmers who grow peppers in the open ground, to reduce the risks associated with heat and temperature changes

Keywords: *Capsicum annuum* L.; density of the shading grid; biometric parameters of plants; productivity; profitability

Introduction

Sweet pepper is a heat-loving crop, but excessive solar radiation can lead to overheating of plants, sunburn, and reduced photosynthetic activity. Optimal shading helps to reduce moisture evapouration, maintain a favourable microclimate, and reduce the temperature of the soil and air around plants, which has a positive effect on moisture retention and nutrient absorption. In addition, shading can help to improve the marketable appearance of fruits, preventing them from burning out in the sun, which is important for the market quality of products. The study of shading efficiency allows determining the optimal shading levels for different climatic conditions, determining the effectiveness of appropriate technological measures, such as the use of nets with different densities, agrofibre or mixed planting with other crops, and developing recommendations for farmers to increase the productivity of sweet pepper.

Sweet pepper (*Capsicum annuum L.*) is one of the most valuable vegetable crops due to its rich chemical composition and high nutritional value. According to L. Pylypenko & O. Shabetya (2020), its value is determined by the high content of organic acids, salts, nitrogenous substances, and sugars, which makes fruits not only useful, but also an important component of a healthy diet. In addition, the researchers noted that there is a correlation between the morphological characteristics of plants and their economically valuable traits, which is important for breeding and seed production. S. Vdovenko & P.A. Shvydkyi (2023) characterised pepper fruits as a multivitamin product because they contain significant amounts of vitamin C (100-300 mg/100 g). The researchers pointed out that ascorbic acid is a powerful antioxidant that helps to strengthen the immune system and increase the body's resistance to adverse environmental factors.

The level of vitamins and biologically active substances in pepper largely depends on the growing conditions, in particular, light, humidity, and temperature conditions. Accordingly, the introduction of technological solutions aimed at regulating microclimatic factors can have a significant impact on the preservation of the quality characteristics of fruits. Optimisation of growing conditions, including shading systems, is an important area of research that contributes to improving the qualitative and quantitative indicators of crop yield (Vdovenko *et al*., 2024).

The study by J. Díaz-Pérez (2013) considered that one of the solutions to mitigate the effects of high temperatures in vegetable growing systems is to manipulate plant development and growth using screens or grids. The implementation of this technological measure does not require high financial and resource costs and is very actively used in different countries of the world, but in different soil and climatic conditions, their effectiveness varies significantly and requires research to clarify the most effective parameters of measures to reduce solar insolation. G. Caruso *et al*. (2020) proved that extreme fluctuations in air temperature and solar radiation during the growing season are vital for plant growth and yield. It was noted that the introduction of shading provided an increase in the pigment content in chloroplasts and improved photosynthesis processes.

X. He *et al*. (2021) noted that, on the one hand, ultraviolet radiation increases the development of secondary metabolites in plants, such as flavonoids, phenol derivatives, ascorbic acid, and carotenoids, which affects changes in the colour of leaves, flowers, and fruits, improved taste of products and greater resistance to pests and diseases. On the other hand, this type of radiation can cause DNA damage and inhibit photosynthesis, reducing growth and causing plant compactness. S. Stanghellini *et al*. (2011) noted that most vegetable crops are sun-loving, for which productivity increases almost linearly with the intensity of photosynthetically active radiation. E. Kitta *et al*. (2014) investigated the photosynthetic acclimatisation of sweet pepper plants to protected soil conditions, noting that shading promotes plant adaptation and can improve their water regime. They found that such conditions help to reduce moisture loss and maintain a stable level of productivity even in water scarcity. Yu.M. Syromyatnikov (2023) analysed the impact of technological measures on soil moisture saturation in sugar beet cultivation and noted that the introduction of certain agrotechnical techniques allowed reducing water evapouration and improving the water balance of agrocoenoses. Thus, both studies confirmed the positive effect of shading on the water regime of crops, especially in conditions of drought and insufficient precipitation.

Findings of O. Mohawesh *et al*. (2022) demonstrated a positive effect of coloured shading grids on a significant decrease in peak daytime air temperatures and light intensity (from 22 to 28°C and 9,992 Lux, respectively) compared to the control (from 32 to 37°C and 24,973 Lux, respectively), which further provided an increase in the productivity of sweet pepper plants (an increase in plant height, leaf area, an increase in the amount of chlorophyll in the leaves and vitamin C in ripe fruits. According to Hungarian researchers H. Darázsi Ledóné *et al*. (2017) for growing sweet peppers in tunnels, the use of a green shading grid led to a decrease in yield, while yellow and red grids contributed to an increase in yield and fruit quality of the crop. It was indicated that the intensity of grid shading should not exceed 35-40%.

Thus, it should be noted that the effect of shading on the growth and productivity of pepper plants significantly depends on the soil and climatic conditions of cultivation. Thus, the purpose of the study was to establish the effect of using a shading grid of different densities on the growth, development and productivity of sweet pepper plants in irrigated conditions of the Left-Bank Forest-Steppe of Ukraine.

Materials and Methods

The research was conducted during 2022-2023 at the Institute of Vegetable and Melon Growing of the National Academy of Agrarian Sciences of Ukraine, in typical soil and climatic conditions of the Left-Bank Forest-Steppe of Ukraine. Sweet pepper was grown by seedling method using drip irrigation. Its predecessor was cucumber. Seedlings were grown in a heated film greenhouse. Sowing was carried out in the second ten days of March. Before selection, the seedlings were tempered for 8-10 days and at the time of planting, the pepper seedlings had a well-branched root system. Seedlings (60-day) were planted in the second decade according to the scheme (60 + 40) × 35 cm. According to the research scheme, the shading grid was installed in the second decade of June, that is, at the beginning of the period of hot weather in given soil and climatic conditions.

Two types of shading grid were used in the studies: with a 45% shading effect and with a 60% shading effect, the effectiveness of which was studied on two varieties of sweet pepper Liubasha and Svitozar. Liubasha is a medium-ripened variety (103-107 days) selected by the Institute of Vegetable and Melon Growing of the National Academy of Sciences, which has broad-cone fruits of light yellow (bright red when ripe) colour, 9-11 cm long, weighing 130-150 g, with a wall thickness of 7-8 mm. The plant is compact, standard. The variety is characterised by resistance to wilting and viral diseases. Potential yield, t/ha: 42-45 t/ha. Svitozar is a medium-late variety (117-125 days) selected by the Institute of Vegetable and Melon Growing of the National Academy of Sciences, which has cuboid fruits of yellow-green (bright red when ripe) colour, 9-10 cm long, weighing 120-130 g, with a wall thickness of 6-9 mm. The plant is compact, standard, short. The variety is characterised by resistance to TMV. Potential yield, t/ha: 36-42 t/ha.

The study was conducted according to the methodology of research in vegetable growing (Bondarenko & Yakovenko, 2001). The area of the registered plot was 25.2 m^2, repetition – quadruple. In the experiment, biometric parameters of plants (plant height, bush diameter, fruit height and diameter) were considered, elements of plant productivity (number of fruits per plant, fruit weight, plant productivity) and fruit yield (by the method of dividing weighing by the onset of technical ripeness) were determined.

The economic analysis was carried out based on the calculation of net income, production cost, and profitability level. Statistical processing of the findings was implemented by the method of variance analysis. Experimental studies of cultivated plants, including the collection of plant material, were in accordance with institutional, national or international guidelines. The authors adhered to the Convention on Biological Diversity (1992) standards.

Results and Discussion

A certain dependence of the effectiveness of introducing shading in the technology of growing sweet pepper on the plant variety is established (Table 1). For the medium-ripened Liubasha variety, the introduction of shading indicated a significant increase in such biometric parameters of plants as height (by 17.8-21.5% relative to the control), bush diameter (by 18.7-23.7%), fruit height (by 10.1-15.2%), and a positive trend towards increasing the diameter of sweet pepper fruit (by 4.7-6.6%). Different shading options (45% and 60%) did not differ significantly.

Table 1. *Influence of shading on biometric parameters of sweet pepper plants (average for 2022-2023)*

Shading options	Biometric parameters of pepper plants			
	Plant height, cm	Bush diameter, cm	Fruit height, cm	Fruit diameter, cm
	Liubasha variety			
No shading (control)	51.1	43.9	9.9	6.98
Shading by 45%	60.2	52.1	10.9	7.44
Shading by 60%	62.1	54.3	11.4	7.31

Table 1. *Continued*

Shading options	Biometric parameters of pepper plants			
	Plant height, cm	Bush diameter, cm	Fruit height, cm	Fruit diameter, cm
Svitozar variety				
No shading (control)	50.9	49.1	6.75	6.75
Shading by 45%	51.9	56.5	7.38	7.38
Shading by 60%	54.8	60.0	7.19	7.19
$LSD_{0.95}$	5.25	5.62	0.81	0.70

Source: compiled by the authors

For the medium-late Svitozar variety, the introduction of shading provides only a significant increase in the diameter of the sweet pepper bush by 15.1-22.2%. According to the effect on the height and diameter of the fruit, shading causes only a positive trend. A positive trend was also noted for the height of plants using 60% shading.

Shading had a different effect on the productivity parameters of pepper plants of the varieties under study (Table 2). It was noted that when using shading by 45% for both varieties, there was a significant increase in the number of fruits on the plant (by 11.5% for the Liubasha variety and by 48.5% for the Svitozar variety). Increasing the density of shading nets by up to 60% leads to a decrease in the number of fruits on pepper plants. For the Liubasha variety, this decrease is significant. For the Liubasha variety, the use of shading provides an increase in the average weight of the fruit. Fruit weight increased by 11.1-25.6%. For the medium-late Svitozar variety, the use of shading nets leads to a decrease in fruit weight by 17.9-60.2%.

Table 2. *Dependence of elements of productivity of sweet pepper plants on shading (average for 2022-2023)*

Shading options	Productivity indicators of sweet pepper plants		
	Number of fruits per plant, units/plant	Average fruit weight, g	Plant productivity, g/plant
Liubasha variety			
No shading (control)	5.20	90	469
Shading by 45%	5.80	100	583
Shading by 60%	4.25	113	481
Svitozar variety			
No shading (control)	4.95	117	499
Shading by 45%	7.35	73	536
Shading by 60%	4.80	96	462
$LSD_{0.95}$	0.54	9.8	45.6

Source: compiled by the authors

The positive effect of shading plants on increasing the productivity of the sweet pepper variety Liubasha was noted. When using 45% shading, the plant productivity was 583 g/plant, while without shading, this figure was 469 g/plant. When using 60% shading, plant productivity does not increase significantly, which is associated with the formation of fewer fruits on plants.

For the Svitozar variety, 45% shading provides only a positive trend in increasing productivity (the growth relative to control is only 7.4%). The introduction of 60% shading generally leads to a negative trend in plant productivity; the indicator decreases from 499 g/plant in the control to 462 g/plant.

The yield of sweet pepper plants depends to a certain extent on the productivity of the plants (Fig. 1). In the conditions of 2022, there was a significant increase in the yield of Liubasha pepper with the use of 45% shading. The yield increase was 0.43 kg/m² or 18.2% relative to the control with a yield of 2.36 kg/m².

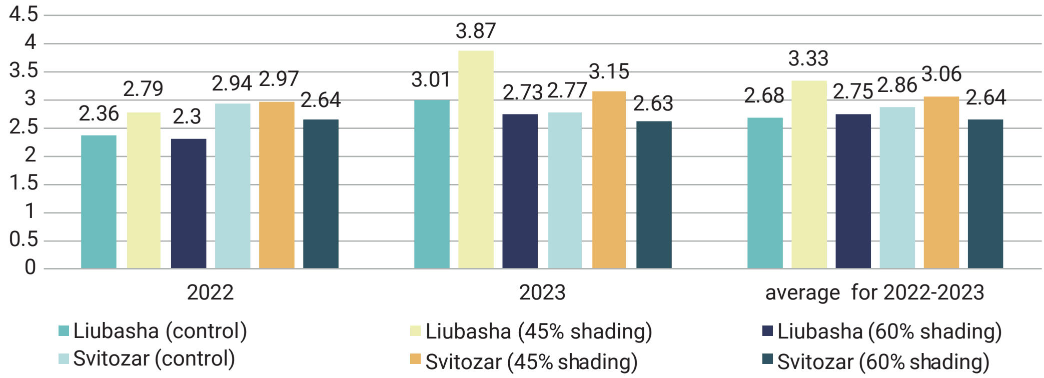

Figure 1. *Yield of sweet pepper varieties depending on shading, kg/m²*

Note: $LSD_{0.95}$ for 2022 = 0.21 t/ha; $LSD_{0.95}$ for 2023 = 0.26 t/ha)

Source: compiled by the authors

In 2023, the yield of the Liubasha variety also increased significantly with the use of 45% shading, providing an increase of 0.86 kg/m² or 28.6%, and Svitozar varieties (increase of 0.38 kg/m² or 12.6%). On average, over two years, there was a significant increase in yield with the use of 45% shading only for the Liubasha variety (an increase of 0.65 kg/m² or 24.3%). The introduction of 60% shading does not provide an increase in the yield of sweet pepper. Despite the increase in the yield of sweet pepper for the use of shading nets, this technological measure is economically justified due to the payback of the cost of shading nets for three years of operation (Table 3). The maximum economic indicators were noted for options with the maximum increase in the yield of pepper fruits. Even with the payback of the cost of purchasing a grid for one year for growing the Liubasha variety, the use of shading with a 45% grid provides an additional profit of 4.85 UAH/m² but the level of profitability was still less than the control (90.0%) and is 73%.

Table 3. *Economic efficiency of sweet pepper shading (average for 2022-2023)*

Shading	Economic indicators					
	Total yield, kg/m²	**Full expenses, UAH/m²**	**Profit, UAH/m²**	**Profit from shading, UAH/m²**	**Production cost, UAH/kg**	**Profitability of production, %**
Payback of grid purchase costs in one year						
1. Liubasha (control)	2.68	49.40	44.40	-	18.43	90.0
2. Liubasha (45% shading)	3.33	67.30	49.25	4.85	20.21	73.0
3. Liubasha (60% shading)	2.75	74.40	21.85	-22.55	27.05	29.4
4. Svitozar (control)	2.86	50.10	50.00	-	17.52	99.8
5. Svitozar (45% shading)	3.06	68.00	39.10	-10.90	22.22	57.5

Table 3. *Continued*

Shading	Economic indicators					
	Total yield, kg/m²	**Full expenses, UAH/m²**	**Profit, UAH/m²**	**Profit from shading, UAH/m²**	**Production cost, UAH/kg**	**Profitability of production, %**
6. Svitozar (60% shading)	2.64	75.10	17.30	-32.70	28.44	23.0
Payback of grid purchase costs in three years						
1. Liubasha (control)	2.68	49.40	44.40	-	18.43	90.0
2. Liubasha (45% shading)	3.33	57.40	59.15	14.75	17.23	103.0
3. Liubasha (60% shading)	2.75	59.70	36.55	-7.85	21.71	61.2
4. Svitozar (control)	2.86	50.10	50.00	-	17.51	99.8
5. Svitozar (45% shading)	3.06	58.10	49.00	-1.00	18.99	84.3
6. Svitozar (60% shading)	2.64	60.40	32.00	-18.00	22.88	52.9

Source: compiled by the authors

With the payback of the cost of purchasing a grid for three years of use for shading, 45% of the grid provides an increase in the level of profit for the Liubasha variety up to 14.75 UAH/m^2, profitability up to the level of 103.0%, which significantly exceeds the economic indicators of growing the Liubasha variety without shading.

The positive effect of using a shading grid with a density of 45% on the biometric parameters of sweet pepper plants was also noted in the study by E. Driesen *et al.* (2020), where the increase in plant growth rates was attributed to positive changes in the stomatal index and increased photosynthetic productivity, and in study by M. Möller & S. Assouline (2007) by reducing the intensity of water evapouration by 38%. According to R. Padrón *et al.* (2015) under optimal irrigation conditions, the use of a shading grid provided the highest plant height, stem diameter and leaf area Index, number of leaves per plant, and high dry matter content in plant leaves.

However, according to D. De la Cruz-Ricardez *et al.* (2023), shading has a positive effect on plant growth and productivity of certain genotypes of sweet pepper plants, especially those where the introduction of shading reduces the ripening period of fruits. For some varieties and hybrids, the introduction of this technological measure does not ensure the growth of biometric parameters of plants. According to S. Saha *et al.* (2010), different intensity of shading exposure is associated with differential sensitivity of genotypes to heat, which, in turn, depends on the proline content in the leaves of the culture. A decrease in the content of proline in the leaves of plants of sensitive genotypes at high temperatures was also noted, while heat-resistant varieties produce more proline, which indicates the role of proline in the manifestation of heat resistance of the corresponding sweet pepper genotypes.

J. Al-Bakri *et al.* (2013) point out the need for significant changes in the technological processes of crop cultivation under the influence of global warming and climate transformation. Without the introduction of additional protective measures to reduce the adverse effects of critical temperatures, the productivity of agricultural plants may decrease due to the appearance of abiotic disorders (Ilić *et al.,* 2017; Flaishman *et al.,* 2015). A similar situation is observed in the soil and climatic conditions of Ukraine, where extreme weather conditions significantly reduce the productivity of agricultural plants, including sweet pepper.

T. Dueck *et al.* (2016) noted that manipulating the plant growth environment is a key aspect of improving agricultural productivity and improving the quality of crop production. S. Demotes-Mainard *et al.* (2016) recommended implementing light intensity regulation through the introduction of various photoselective networks. In fact, the maximum assimilation of carbon dioxide for most C3 plant species occurs with relatively low radiation exposure (600-900 μmol×m^{-2} × s^{-1}), which corresponds to 30-40% of total sunlight on a typical summer day. Thus, according to M. Flaishman *et al.* (2015) the resulting excess solar energy causes increased photoinhibition processes, heat stress, and stomatal closure in plants, which leads to a decrease in the net productivity of photosynthesis. In addition, stable high temperatures (35-40°C) due to high solar radiation can impair cell division, leaf growth, and reproductive development.

Since a certain dependence of plant growth processes on the quality, quantity, and frequency of light is established, the use of shading grids is an effective way to reduce solar radiation by regulating the quality of lighting by increasing the relative proportion of scattered light. E. Kitta *et al.* (2014) noted the positive effect of using shading net as a physical protection against birds and insects. Agricultural producers also use shading nets separately, and integrate them with existing greenhouse technologies. The introduction of grids for shading different colours acts as an effective factor in increasing the relative amount of diffused light and absorbing various spectral bands, providing significant changes in the light environment. According to E. Kitta *et al.* (2014), the introduction of shading provides a significant reduction in the effects of stressors (biotic and abiotic), which ultimately leads to improved plant growth.

Z.S. Ilić *et al.* (2012) indicated that the use of coloured shading grids provides an increase in tomato yield in the range of 113-131%. A. Goren *et al.* (2011) reported a 35% reduction in pepper fruit damage when using pearlescent and yellow mesh as a shading material compared to black and red shading nets. Although black shading nets are most commonly used worldwide, there is growing interest in shading nets of different colours to improve plant growth, yield, and quality. As noted by K. Folta & S. Maruhnich (2007), using different coloured shading grids, it is possible to manipulate plant growth and development by affecting numerous photoreceptors

The positive effect of shading ensures an increase in the yield of sweet pepper, affecting various physiological processes in plants and, in general, the productivity of agrocoenoses. The positive impact of using this technological approach, which was noted in the current study, was also noted by S. Alkalai-Tuvia *et al.* (2014) and A. Goren *et al.* (2011), which also noted the positive effect of shading and the use of red, pearlescent, and yellow grids for shading on the biochemical composition of pepper fruits.

According to Z. Nagy *et al.* (2014) the introduction of shading did not contribute to an increase in pepper plant productivity, but a significant increase in the vitamin C content of the fruit was found. The growth of fruit quality indicators without increasing the productivity of pepper plants with the use of shading was indicated by the results of K. Selahle *et al.* (2015), but researchers have also noted a positive effect of shading on increasing fruit resistance to rotting diseases during post-harvest storage.

Both in the current study and in the papers by N. Jeeatid *et al.* (2017) and Y. Jiménez-Viveros *et al.* (2023) proved the fact of a positive effect on the productivity of pepper plants of a moderate level of shading. In the current study, increasing the mesh density to 60% for the medium-ripened Liubasha pepper variety did not cause a change in the yield level, while for the medium-late Svitozar variety, it even caused a tendency to decrease the fruit yield. According to Y. Jiménez-Viveros *et al.* (2023), the introduction of shading nets or plastic coatings to reduce light intensity does not provide a positive consistent response to the phytochemical profile of pepper plants, since the intensity of vegetative mass growth and yield development depends on many factors. The study by N. Jeeatid *et al.* (2017) noted that the maximum positive effect is provided by the interception of 35% of total sunlight, but under the condition of optimal daily irrigation, that is, controlling the conditions of moistening sweet pepper plants.

The results of the current research are completely different from the findings of G. Timmermans *et al.* (2020) and E. Kesumawati *et al.* (2020), in which shading pepper plants did not provide an increase in fruit yield and an improvement in their quality characteristics. According to E. Kesumawati *et al.* (2020), the use of shading nets with densities of 25% and 50% in basic biometric parameters and yield was inferior to that of pepper in the control without shading. But these studies were conducted on hybrids that were specially created for the appropriate soil and climatic conditions, and, consequently, are characterised by increased resistance to abiotic factors.

Conclusions

The introduction of a grid in the technology of growing sweet pepper to reduce sunlight by 45% and 60% provides a significant increase in the diameter of plants for the medium-ripened Liubasha variety and the medium-late Svitozar variety by 15.1-23.7%. For the Liubasha variety, when using shading, there was a significant increase in plant height by 17.8-21.5% and fruit height by 10.1-15.2%.

A significant increase in the number of fruits on the plant causes only the use of a grid with a density of 45%. With this technological approach, the number of fruits on plants of the Liubasha variety increases by 11.5%, for the Svitozar variety – by 48.5%. With an increase in the degree of shading (using a shading grid with a density of 60%), a smaller number of fruits are formed on sweet pepper plants of both varieties, even relative to the pepper growing system without shading.

For the Liubasha variety, an increase in the average fruit weight for using all shading options was noted by 11.1-25.6%, for the Svitozar variety – a decrease by 17.9-60.2%.

A significant increase in the yield of sweet pepper was noted only for the Liubasha variety with the use of a 45% shading grid, which provides an increase in yield by 0.65 kg/m^2 or 24.3% relative to control. For the medium-late Svitozar variety, shading with a grid with a density of 45% causes only a positive trend in increasing yield (the increase was 0.2 kg/m^2 or 7.0% relative to control).

According to the analysis of economic efficiency, considering that the cost of purchasing the grid will be distributed over three years of its operation, the introduction of shading with a density of 45% leads to an increase in net profit for the Liubasha variety to the level of 14.75 UAH/m^2, the level of profitability up to 103%, reduction in the cost of production to 17.23 UAH/kg (under control – 18.43 UAH/kg).

In the future, it is advisable to study in depth the effect of different shading levels on the morphophysiological parameters of plants, in particular, on the intensity of photosynthesis, transpiration, leaf surface temperature, and water balance. This would allow determining the optimal shading conditions that will help to increase crop productivity in a variable climate.

Acknowledgements

None.

Conflict of Interest

None.

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Ефективність затінення перцю солодкого за вирощування в Лісостепу України

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Анотація. Метою наукової роботи було встановлення впливу затінювальної сітки різної щільності на ріст, розвиток і продуктивність рослин перцю солодкого в умовах зрошення Лівобережного Лісостепу України. Роботу проведено в Інституті овочівництва і баштанництва Національної академії аграрних наук України за загальноприйнятими методиками за допомогою польового методу досліджень. Реалізація досліджень передбачала визначення впливу впровадження затінення рослин сітками зі щільністю 45 % та 60 % на біометричні параметри та продуктивність рослин перцю солодкого, економічні показники ефективності вирощування. Встановлено, що затінення забезпечує істотне підвищення параметру діаметр рослин перцю солодкого для обох сортів (на 15,1-23,7 %), а також тільки для сорту Любаша – підвищення висота рослин (на 17,8-21,5 %) та висоти плоду (на 10,1-15,2 %). Затінення з використанням сітки зі щільністю 45 % забезпечує для обох сортів істотне підвищення кількості плодів на рослині (на 11,5 % для сорту Любаша та на 48,5 % для сорту Світозар). Збільшення параметру щільності сіток для затінення до 60 % зумовлює зменшення кількості плодів на рослинах. Відзначено, що для сорту Любаша зростання середньої маси плоду за використання затінення складає 11,1-25,6 %, для сорту Світозар даний показник зменшується на 17,9-60,2 %. Істотне підвищення урожайності перцю солодкого забезпечує використання затінення сіткою зі щільністю 45 % тільки для сорту Любаша (зростання на 24,3 %). За вказаного технологічного підходу підвищуються економічні параметри вирощування перцю солодкого (прибуток до 14,75 грн/м2, рентабельність до 103 %). Результати дослідження можуть бути корисними для малих та середніх фермерів, які вирощують перець у відкритому ґрунті, з метою зниження ризиків, пов'язаних зі спекою та перепадами температур

Ключові слова: *Capsicum annuum* L.; щільність затінювальної сітки; біометричні параметри рослин; продуктивність; рентабельність