



PRODUCTION OF CHERRY TOMATO CHIPS IN DIFFERENT TYPES OF PROTECTED ENVIRONMENT

PRODUÇÃO DE MUDAS DE TOMATE CEREJA EM DIFERENTES TIPOS DE AMBIENTE PROTEGIDO

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Abstract

The objective of this work was to evaluate the production of cherry tomatoes in protected environments composed of different photosensitive screens. The work was conducted in June / July 2018. The treatments consist of different types of protected environments: open sky, black screen (mesh for 30% shade); white fabric (mesh for 20% shade); blue screen (mesh for 20% of shade) and red screen (mesh for 20% of shade). The experimental design was a randomized block with four replicates, ten plants per experimental plot. The following analyses were performed on cherry tomatoes: leaf number, stem diameter, shoot height, root length, total fresh matter, shoot fresh matter, fresh root matter, shoot dry matter, root, chlorophyll a and chlorophyll b. The black shading, white photosensitive, blue photosensitive and red photosensitive screens did not influence the number of leaves, stem diameter, shoot height, root length, total fresh matter, fresh shoot matter, aerial shoot dry matter, root dry matter, chlorophyll a and chlorophyll b. The red photosensitive screen showed superiority in the fresh matter of the root of the other treatments.

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Resumo

O objetivo deste trabalho foi avaliar a produção de mudas de tomate cereja em ambientes protegidos compostos por diferentes telas fotosselativas. O trabalho foi conduzido em junho/julho de 2018. Os tratamentos consistem em diferentes tipos de ambiente protegido: céu aberto, tela preta (malha para 30% de sombra); tela branca (malha para 20% de sombra); tela azul (malha para 20% de sombra) e tela vermelha (malha para 20% de sombra). O delineamento experimental foi em blocos casualizados com quatro repetições, sendo dez plantas por parcela experimental. Foram realizadas as seguintes análises no tomate cereja: número de folhas, diâmetro do caule, altura da parte aérea, comprimento da raiz, matéria fresca total, matéria fresca da parte aérea, matéria fresca da raiz, matéria seca da parte aérea, matéria seca da raiz, clorofila a e clorofila b. As telas de sombreamento preta, fotosselativa branca, fotosselativa azul e fotosselativa vermelha não influenciaram o número de folhas, diâmetro do caule, altura da parte aérea, comprimento da raiz, matéria fresca total, matéria fresca da parte aérea, matéria seca da parte aérea, matéria seca da raiz, clorofila a e clorofila b. A tela fotosselativa vermelha demonstrou superioridade na matéria fresca da raiz em relação aos demais tratamentos.

INTRODUCTION

The tomato (*Lycopersicon esculentum* Mill) is a perennial plant, of shrub size, being cultivated annually

(ALVARENGA, 2004). It is a vegetable from the Solanaceae family, of the genus *Lycopersicon*, with alternating leaves, composed of an odd number of

leaflets, petiolate and serrated edges, being one of the most important vegetables grown in the world (FILGUEIRA, 2000). Currently, the cultivation of cherry tomatoes (*L. esculentum* var. *Cerasiforme*) has expanded considerably, achieving great acceptance in the market and compensating prices. Its exploitation as an ornamental plant may constitute yet another important alternative for agribusiness (BAI FILHO et al., 2014).

The use of cherry tomatoes as an adornment, appetizer and in the preparation of various dishes is one more option of consumption of this vegetable (GUSMÃO et al., 2000). According to Lopes & Stripari (1998), the tomato is a plant very sensitive to climatic conditions and these, when unfavorable and allied to other factors, contribute to its cultivation, in protected conditions, increasing rapidly in recent years.

One of the ways to meet the needs of the market is through the use of high-quality agronomic seedlings produced with specific technology, such as the use of organic substrates. This input provides higher yield compared to traditional methods because it presents greater precocity, less possibility of contamination by phytopathogens, the higher percentage of use in the seedling/seed ratio and generates less stress in transplantation, besides providing favorable conditions for the development of the root system. (SILVEIRA et al., 2002).

Nurseries have a preference for trays with a greater number of cells for better use of substrates and space in greenhouses. However, producers seek to acquire better quality seedlings, with good rooting and leaf development, to allow greater amplitude in the period of transplanting the trays to the field. In this system, plants make the most efficient use of water and, thus, reduce water requirements. Another major factor for production in a protected environment is the better use of essential resources for production (nutrients, sunlight and CO²), which reduces the use of inputs,

such as fertilizers (fertigation) and pesticides (PURQUERIO; TIVELLI, 2006), incurring cost reduction and, consequently, greater profitability for the producer. Godoy and Cardoso (2005) highlight that the savings obtained may be insufficient for the adequate development of seedlings, preventing the available cultivars from expressing their potential, reducing productivity and product quality.

Photoselective screens have been used in the cultivation of different plant species as a protective factor or for modifying the light spectrum that affects plants. This is an efficient way to modify the climate and ensure better environmental control, through the use of screens and plastics that alter the light spectrum. Special additives added to its composition can decompose direct light into diffuse light, which is multidirectional, promoting better use of light by plants. The lower incidence of solar energy can contribute to reducing the extreme effects of radiation, especially photorespiration, and provide better environmental conditions, increasing the productivity and quality of leaves for consumption (MACIEL et al., 2009).

The objective of this work was to evaluate the production of cherry tomato seedlings in different types of protected environments.

MATERIAL AND METHODS

The experiment was conducted at the experimental farm of the State University of Minas Gerais (UEMG), Ituiutaba unit, located 5.23 km from the municipality of Ituiutaba - MG, whose geographical coordinates are 18° 57' 02.96" S and 49° 31' 34.37" W.

The photoselective protection and shading screens manufactured by the company ChromatiNet® were used in the experiment, with black shading screen 30%, white photoselective screen 20%, blue photoselective screen 20% and red photoselective screen 20%.

The experimental design was in randomized blocks, with five treatments (Table 1) and four replications, containing ten plants per experimental plot.

Table 1. Treatments used to assess the protected environment, Ituiutaba - MG, 2018.

Treatments
T1. Open sky (Witness)
T2. Black shading screen
T3. White photoselective screen
T4. Blue photoselective screen
T5. Red photoselective screen

Five treatments were evaluated, which consisted of four types of protected environment, and an environment characterized by open cultivation. Initially, the seeds of cherry tomatoes (*Lycopersicon lycopersicum*) of the brand Isla® Seeds were sown, in plastic trays of 128 cells, containing the commercial agricultural substrate of the Bioplant® brand indicated for the production of vegetable seedlings, and the sowing was held on June 1, 2018.

Ten cells were filled in each plot with the Bioplant® substrate, containing 2 seeds (depth 3 cm) per cell if one seed does not pass, totaling 200 plants in the final stand. Irrigation was performed manually with watering cans every day, with the same amount.

Seedling emergence occurred in 6 DAS (days after sowing). At 5 days after the emergence of cherry tomatoes, thinning and relocation of seedlings was carried out in the protected environments described in the treatments.

The protected environments consisted of four greenhouses (T2, T3, T4, and T5), built with wood, with dimensions of 5.0 m long by 5.0 m wide and ceiling height of 1.80 m. Monitoring of seedlings was carried out daily, observing their development in both environments.

After 31 DAS, the seedlings of each plot were evaluated, evaluating the following characteristics: number of leaves: obtained by the total number of leaves in each plot, divided by the number of seedlings; stem diameter (mm): obtained with the aid of a Digital Caliper; height of the aerial part and length of the root (cm): obtained with the aid of a millimeter ruler; total fresh matter: obtained by the total weight of the seedlings of each useful parcel, divided by the number of seedlings of each useful parcel, with the aid of a precision scale with a result given in g; fresh matter of the aerial part: obtained by the total weight of the aerial part of each useful parcel, divided by the number of seedlings of each useful parcel, with the aid of a precision scale with result given in g; fresh root matter: obtained by the total root weight of each useful parcel, divided by the number of seedlings of each useful parcel, with the aid of a precision scale with a result given in g; dry matter of the aerial part and root: obtained in an oven with forced air circulation, at a temperature of 60°C for 24 hours until reaching constant weight, being enough time for all treatments.

Total weight of the dry aerial part and root of each useful parcel, divided by the number of seedlings of each useful parcel, with the aid of a precision scale with a result given in g; Chlorophyll a and b: obtained from a randomly expanded leaf of 3 plants from each plot, to determine the chlorophyll content, whose measurement method is by difference in optical density between two wavelengths, with the aid of a chlorophyll meter (ChlorofiLOG).

Subsequently, the data obtained were subjected to analysis of variance (Test F) and the means of treatments were compared using the Tukey test at 5% probability. The analyses were performed with the aid of the SISVAR software, version 5.6.

RESULTS AND DISCUSSION

Tables 2 and 3 show the averages of the analysis of variance for the agronomic characteristics evaluated, with no effects on the number of leaves (NF), stem diameter (DC), shoot height (PA), root length (CR), total fresh matter (MFT), shoot fresh matter (MFPA), being that root fresh matter (MFR) superiority of the red photosensitive screen (T5) was observed about the other treatments.

Table 2. The average number of leaves (NL), stem diameter (SD), shoot height (SH), root length (RL), total fresh matter (TFM), shoot fresh matter (SFM), fresh matter of the root (FMTR) of cherry tomato seedlings grown in different types of protected environment.

Treatments	NL	SD (mm)	SH (cm)	RL (cm)	TFM (g)	SFM (g)	FMTR (g)
T1	3,49	1,89	9,28	8,21	0,509	0,379	0,052 b
T2	3,08	2,14	11,05	8,81	0,646	0,484	0,072 b
T3	3,24	1,87	10,24	9,45	0,600	0,398	0,093 b
T4	2,99	1,85	9,78	8,41	0,499	0,333	0,085 b
T5	3,41	2,14	10,53	8,98	0,698	0,428	0,126 a
DMS	1,02	0,74	2,43	2,29	0,48	0,29	0,05
CV %	14,02	16,60	10,59	11,58	36,38	31,83	28,85

Averages followed by the same letter do not differ between environments, using the Tukey test at 5% probability. DMS: significant mean difference.

Table 3. Averages of shoot dry matter (SDM), root dry matter (RDM), chlorophyll *a* and chlorophyll *b* of cherry tomato seedlings grown in different types of the protected environment.

Treatments	SDM (g)	RDM (g)	Chlorophyll <i>a</i>	Chlorophyll <i>b</i>
T1	0,051	0,014	18,87	5,97
T2	0,068	0,018	23,85	6,1
T3	0,058	0,016	27,70	7,17
T4	0,045	0,019	15,75	4,60
T5	0,060	0,020	25,82	6,52
DMS	0,03	0,008	14,69	4,68
CV %	24,86	19,86	29,09	34,17

Averages followed by the same letter do not differ between environments, using the Tukey test at 5% probability. DMS: significant mean difference.

In all the characteristics evaluated, the treatments tested did not differ statistically, only in T5 (fresh matter of the root), there was a difference in the other treatments. These data show that the protected environment (red screen) responded better. According to Ballaré et al. (1992), phytochrome detects radiation in the range of red (V) and extreme red (Ve) and is linked to changes in the morphology of plants in competition, which can affect the availability of the necessary resources for growth and also modify the ambient light that is used by plants in determining the growth pattern. Red screens can change the V: Ve ratio.

Arnim and Deng (1996) and Wei and Deng (1996), consider that there is the participation of genes that modify the relationships between plant regulators. Thus, gibberellin and cytokinin may be involved in modifying the allocation of dry mass due to changes in the quality of light, with gibberellin acting on cell elongation and cytokinin promoting cell division.

According to Bezerra Neto et al. (2005), when evaluating lettuce productivity as a function of shading conditions and high temperature and brightness, found significant differences between the types of shade screen in the number of leaves per plant and the lettuce productivity, with the white color highlighting yourself

from the others. However, the data differ from this experiment, which found no difference between treatments.

These data are in agreement with that found by Silva et al. (2013), who, when assessing the growth of tomato seedlings with different shade screens, found that the black and red screen did not influence the final height of the plants, final diameter of the stem, and root dry matter. In general, photosynthesis decreases as respiration and photorespiration processes increase, affecting the biomass of the plant as a whole (WAHID et al., 2007; LAMBERS et al., 2008).

Hirata and Hirata (2015), when evaluating the productive performance of watercress cultivated in soil under shade screens, concluded that in the fresh matter mass of the aerial part, the black shade screen responded better than the red photoconverter screen and in full sun. However, the data differ from this tested experiment in that there was no difference between treatments. When we look at the dry matter analysis of the aerial part of the seedlings, the data are by the experiment, that there was no significant difference between treatments (Table 3).

The data found to agree with Hirata (2014), who, when evaluating arugula physiological responses to cultivation under photo converting screens in winter and summer, chlorophyll concentrations were not verified difference between environments.

According to Silva et al. (2015), considered that the use of rice husk as a soil cover and a red photosynthetic canvas with 50% shade is a viable mechanism in the cultivation of crisp lettuce cv. Veronica under the edaphoclimatic conditions of Boa Vista, Roraima. Nomura et al. (2020), there was no effect of photoselective screens on the production of yellow passion fruit seedlings.

CONCLUSIONS

The black, white photosensitive, blue photosensitive and red photoselective shading screens did not influence the number of leaves, stem diameter, shoot height, root length, total fresh matter, shoot fresh matter, shoot dry matter, root dry matter, chlorophyll *a* and chlorophyll *b*.

The red photoselective screen showed superiority in the fresh matter of the root of the other treatments.

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