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THE INFLUENCE OF CULTIVAR ON GROWTH AND PRODUCTIVE POTENTIAL OF TOMATOES GROWN IN SOLARIUMS PROTECTED WITH SELECTIVE PHOTO FILMS

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Abstract

Taking into account the importance of tomatoes in human diet the modern technologies aim is to implement the elements that provide quality products, staggered throughout the year. From these, the growing of vegetables in protected areas and diversification of varieties and hybrids are important to the producers. The paper presents the results regarding tomato culture in greenhouses, that are covered with selective photo foils anti condensation, additivated UV and IR films produced in Romania, and a biofond represented by two different botanical varieties: var. esculentum - hybrid Cindel and var. cerasiforme - Cerise hybrid. It was found that in general, light quality changes influenced the plant growth. In comparison with transparent and untreated films, those of different colors lead decrease the total plant height in both hybrids, with larger differences in Cindel F1. The red films had the strongest inhibiting effect. The height of formation of the first inflorescence was lower for hybrid Cerise and both hybrids were favorably influenced by the transparent film with additives. The photo selective films have influenced the growth of plants, number and average fruit weight. During 2009, the hybrid Cindel present increased yields in comparison with control, as it follows: in green foil (51.6%), transparent UV treated (21%) and yellow (9%). Cerise hybrid yield was strongly influenced, differences to control using the same kinds of films was 61%, 38% and 42%. It was observed that while red film reduced yield for Cindel F1 hybrid, in the case of Cerise had a favorable effect, causing an increase of 39% compared with the control. Using photo selective film of different colours, we can increase yield of tomatoes grown in greenhouses from 34.2 t / ha up to 51.2 t / ha in the case of Cindel F1, and from 23.6 t / ha up to 37.9 t / ha for Cerise.

Keywords**:** *photo selective films; greenhouses; Solanum esculentum; var. esculentum, var. cerasiforme*

INTRODUCTION

Although growing and tilling plants in glasshouses is more expensive then care crops on fields, it proves its economical efficiency and viability through the fact that it can offer means through which it exceeds the drawbacks related to the climatic and biological abridgements of the production [1]. The additional costs which tilling plants in glasshouses dictates are usually vindicated, if the price obtained on the product unit is high [3]. This appears when the production is of better quality, and when the production costs are compensated by the growth of the harvests. The experiment was developed during 2009, in the didactic sector and the experimental, of the University of Agricultural Sciences and Veterinary Medicine – Bucharest, Department of Vegetable Crops, in the greenhouse. In the paper, there are presented results obtained studied the behavior of two different varieties of tomatoes, in favorable conditions for protecting crops with different photo selective soils.

MATERIAL AND METHOD

The experiment was made in tunnel type solars, of high type tunnel. We used the liniar arrangement of blocks method, which was formed of two factors**:**

Factor a- two gradations; it was represented by the cultivars

a_1= *Lycopersicum esculentum* var. *esculentum*: *Cindel(F1)*

a_2= *Lycopersicum esculentum* var. c*erasiforme*: *Cerise*

Factor b - five gradations;

– photo selective films:

b1= red; b2=yellow; b3=green; b4= treated U.V. white; b5=not treated white- version control. By combining the two factors, *10 variants* resulted, and they are presented in Table 1.

Table 1 Tested variants

V1= a_1b_1	V2= a_1b_2	V3= a_1b_3	V4= a_1b_4	V5= a_1b_5
V6= a_2b_1	V7= a_2b_2	V8= a_2b_3	V9= a_2b_4	V10= a_2b_5

Seedlings were produced in heated nurseries, according to known technologies [2]. Seedlings were planted in photo selective covered greenhouses, as soon as the soil temperature was 10-12^{0}C. The establishment of crops, by tilling seedlings, was made on 08 April 2009, by the 70/35 cm scheme, resulting a number of 4 plants / mp (Fig.1).

Fig. 1. Care treatments for tomato

Care of crops was made according to classic technology, and the plant treatments application was excluded, in order to follow the influence of the protection with photo selective foils upon growth and fructification.

RESULTS AND DISCUSSIONS

This year, we studied the influence of foil photoselective protect the plant height, and comparative behaviour of the two hybrids grown under these conditions. Results were recorded at 6 weeks after planting, are presented in Table 2. Data analysis shows that, in hybrid *Cindel*, average plant height was 102.6 cm, recording values for variants grown under film photoselective (V1 - V4), ranging between 85.5 cm and 106.1 cm. Note that these values were much lower than those of the witness (V5), the total plant height was 115.5 cm. Variant 3 green sheet was covered with the highest values (106.1 cm), but lower than the control.

The lower heights were noted in option 1, covered with red foil (85.5 cm). As the height of formation of the first blossoms on the tree as an indicator of the earlier fructification, *Cindel* hybrid media was 27.22 cm and record values for variants grown under film photoselective (V1 - V3) were roughly equal, ranging between 27.40 and 28.9 cm, lower than the untreated control (26.1 cm) - V5 and the average hybrid (27.2 cm). Compared photoselective films of different colours and shades, as witness the film, transparent and UV untreated (V5), as well as UV treated white film (V4), was a much lower value than representing the average hybrid. *Cerise* hybrid of table 2 can be observed that, to witness the untreated film UV (V5) who had plant height of 102.8 cm, superior to all variants grown under colour sheets and hybrid media (93, 70cm). Covered with red foil variants (V1) and yellow foil (V2) had the lowest (83.9 cm and 85.9 cm respectively). The version covered with green foil (V3) there is a value close to that of the control represented by untreated white film (V5), the height is only 1cm lower. If this hybrid formation height of the first inflorescence was on average 22.94 cm. Same value was exceeded by the witness represented by untreated UV transparent film (21.6 cm), as well as variants V2, V3 and V4 in the greenhouses were cover foil yellow, green and white UV treated Under red foil (V1) formed the first inflorescence plants at a height lower than the average hybrid *Cerise*, approximately the size of the witness (V5).

Data analysis shows that six weeks after planting, hybrid *Cindel* had a higher growth than hybrid *Cerise* waist plant, average plant height difference is 8.9 cm. Versions covered with foil on both green photoselective hybrid showed the largest increases from red foil variant V1, V2 and V4-yellow-white film UV treated, recording values of 106.1 cm and 101.8 cm. Witness versions(V5) covered with white sheet untreated, registered in both hybrids, increases both the variants covered with colour sheets and media from hybrids.

Cindel hybrid (fig. 2) at 6 weeks, the number of inflorescences ranged from minimum registered foil variant V4 UV treated white maximum of 6.79 and 7.95 for the variant V3-foil flowers green. Hybrid media was 7.29, a value was below the number of inflorescences formed version control (V5). At 8 weeks, and values ranged from 6.95 to version 6.10 to version V2 and V4-white film UV treated. Average realized in this time of 6.56 inflorescences is equal to version control (V5). At 10 weeks,

version control stands (V5) and V1 variant with values lower than the average variations. Covered with green foil version (V3), and at 6 weeks, had the highest number of flowers formed by the variants. *Cerise* hybrid, in the three readings, no differences was noted to order variations, so the highest values were green film version (V3). Version control (V5) was close to the foil covering of the red version, both versions being below average. Data on the number of fruit per plant shows that the hybrid *Cindel* difference between the highest and lowest number of fruits formed per plant, is 52.46% and 55.37 Cerise differences is the% (Fig.3). Production of tomatoes per plant is influenced by the number of fruit and fruit weight (Table 3). Analyzing the data presented in Table 3, the average number of fruit produced per plant and average fruit weight in tomato hybrids *Cindel* and *Cerise*, shows the following: *Cindel* hybrid, the average number of fruits formed on a plant is between 18.6 and 12.2. Version control, represented by untreated white sheet, with a number of fruit per plant 17.10, exceeding the average variations (16.02) and red foil-protected variants (V1) and yellow (V2). The variants V3 and V4 are an increase in the number of fruit per plant of fruit from 1.1 to 1.5. The average fruit weight is between 69.7 g (V3) and 50.1 g (V5). All variants colour sheets and white version with UV treatment have obtained larger fruit than the control variant. In general, all variants were above the average hybrid, except version V4-white film UV cured, weight of 56.9 g.

Table 2. The influence of protection foil photoselective the total height of the plant and formation of the first inflorescence

Variant	*Cindel*		*Cerise*	
	Total height plant(cm)	Height to first inflorescence(cm)	Total height plant (cm)	Height tofirst inflorescence(cm)
V1: red foil	85,5	28,9	83,9	21,8
V2: yellow foil	101,8	28,3	85,9	22,9
V3: green foil	106,1	27,4	101,8	24,9
V4: white foil treated U.V.	104,8	25,4	94,1	23,5
V5: white not treated - version control.	115,5	26,1	102,8	21,6
Average	102,6	27,22	93,70	22,94

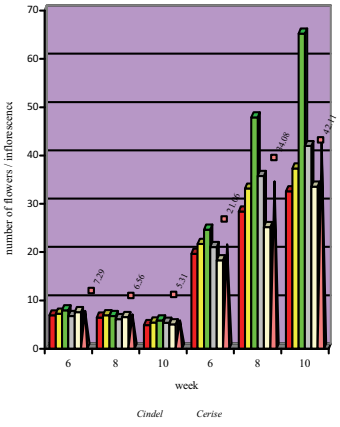

Fig. 2. Dynamics of the number of flowers

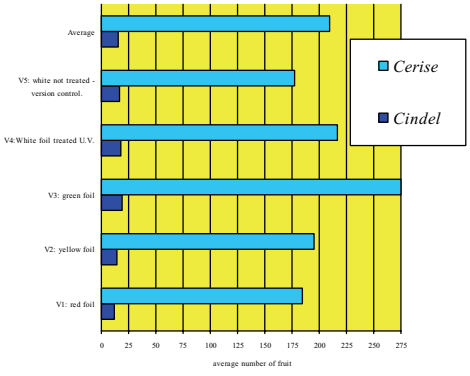

Fig. 3. The influence of photoselective protection foil on the number of fruits formed tomato hybrids *Cindel* and *Cerise*

Table 3. The influence of on the total number of foils photoselective fruit / plant and fruit weight of tomatoes in 2009

Hybrid / Version experimental	*Cindel*		*Cerise*	
	number of fruit / plant	Weight fruit (g)	number of fruit / plant	Weight fruit (g)
V1: red foil	12,2	61,4	185	4,42
V2: yellow foil	14,0	66,7	195	4,28
V3: green foil	18,6	69,7	275	3,45
V4:white foil treated U.V.	18,2	56,9	217	3,75
V5:white not treated - version control.	17,10	50,1	177	3,33
Average	16,02	60,96	209,8	3,85

Table 4. The influence of on the production of tomato photoselective films in 2009

Hybrid / Version experimental	*Cindel*				*Cerise*			
	Producția pe plantă (gr)	Total production (t / ha)	The difference towards witness		Producția pe plantă (gr)	Total production (t / ha)	The difference towards witness	
			(t/ha)	(%)			(t/ha)	(%)
V1: red foil	749,1	29,90	-4,3	87,43	817,07	32,68	9,12	138,71
V2: yellow foil	932,0	37,30	3,10	109,06	834,54	33,38	9,82	141,68
V3: green foil	1297,0	51,84	17,64	151,58	948,20	37,93	14,37	160,99
V4: white foil treated U.V.	1036,1	41,40	7,20	121,05	812,80	32,51	8,95	137,99
V5: white not treated - version control.	856,9	34,20	-	100	589,00	23,56	-	100
Average	974,22	38,93	4,73	113,83	800,32	32,01	8,45	135,87

Photo 1. Inflorescens of tomatoes *Cindel* and *Cerise* (original)

Hybrid Cerise, the average number of fruits formed on a plant is between 275 (V3-green foil) and 185 (V1-red foil). Version control with a mean number of fruits harvested per plant of 177 was below the average hybrid. Data on fruit weight, colour films shows influences of the average fruit weight, ranging from 4.42 g in red foil, from 3.75 g UV treated film. In general, all variants have resulted in increases to the version control fruit weight (3.33 g) and the average hybrid (3.85 g). *Cindel* hybrid largest production plant was made in the film version protected green (1297.0 g), and the lowest production was performed in protected version of red (749.1 g). Version control achieved a production of 856.9 g / plant, just beyond red foil variant (V1). To version control, production increases have been made for variants V3, V4 and V2 of 51.58% (17.64 t / ha), 21.05% (7.20 t / ha) or 9.06% (3.10 t/ha). Version control, represented by untreated white sheet that total production per hectare was 34.20 t, protected version of the film exceeded the red, reducing the production of 12.57%.

At *Cerise*, the average hybrid, which were obtained 32.01 t/ha, other variants have achieved yields ranging from 32.51 to 37.93

t/ha. Both versions covered with foil and colour photoselective the white sheet covered with UV treated exceeded the control variant, the production differences between 14.37 t / ha and 8.95 t/ha. Comparing the yields of both hybrids (tab.4), the largest production in both hybrids was harvested from the film version photoselective protected green. Witness untreated white sheet covered the production was lower than all alternatives, if *Cerise* hybrid and hybrid *Cindel* exceeded the harvested production of red film version. Hybrids exceeded the average in both version controls.

Photo 2. Fruits of hybrids tomatoes (original)

CONCLUSIONS

Cindel tomato hybrids and *Cerise*, botanical varieties belonging *cerasiforme esculentum* respectively, are distinguished by peculiarities of growth and fruiting, and the level of production.

Use sheets of different colors photoselective and UV treated to cover solariums, tomato influence plant growth and their productive potential.

Generally, films and treated photoselective decreasing plant height compared with control represented by untreated white film, the highest values are found in green foil and the lower one red.

Whatever type of film, *Cindel* hybrid was characterized by the waist with higher plants than *Cerise*, a much smaller number of fruits (12 to 19 fruit / plant from 177 to 275 fruits / plant) and their average mass, top (61g / fruit to 4 g / fruit). At both hybrids, productivity parameters reflect the level of production achieved in greenhouses, which reached 34.2 to 51.2 t / ha *Cindel* -37.9 and 23.6 t/ha in *Cerise*, representing increases from the control up to 51.6% and 61% for coverage solariums photoselectives green foil.

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