CONTRIBUTIONS REGARDING THE IMPROVEMENT OF TOMATO PLASTIC COVERED CULTURE SITUATED IN THE PEDOCLIMATIC CONDITIONS OF THE TRANSILVANIAN TABLELAND

CONTRIBUŢII PRIVIND ÎMBUNĂTĂŢIREA SISTEMULUI DE CULTURĂ LA TOMATELE DE SOLAR CULTIVATE ÎN CONDIŢIILE PEDOCLIMATICE ALE PODIŞULUI TRANSILVANIEI

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Abstract. *The research wants to reveal the importance of early spring tomato yields in modern plastic tunnel double covered, situated in the specific pedoclimatic conditions of the Transilvanian tableland with direct implications upon the quantity and quality of yield. The experimental field was founded in 2007 in the vegetable growing sector at the Faculty of Horticulture Cluj-Napoca, Romania. The experiment was conceived as a bifactorial one. The experimental factors where: biological material used (Cronos F1 tomato hybrid (control), Menhir F1 tomato hybrid, Shannon F1 tomato hybrid), plant density (80/40 cm - 31.250 plants/ha (control), 80/30 cm - 41.700 plants/ha) All experimental variants where mulched with black plastic film, and drip fertirigation. The highest blossom link (71.30 %) was recorded at the experimental variant Menhir F1 31.250 plants/ha. The yield dynamic recorded the highest value for Cronos F1 41.700 plants/ha variant. The best fruit quality was observed at the variant Shannon F1 41.700 plants/ha (85.90 % extra quality fruits). The combined influence, plant density and used cultivars revealed the highest production for the variant 80/30 cm (41.700 plants/ha) and Cronos F1 tomato hybrid (20.46 kg/m^2).*

Rezumat. *Experienţa întreprinsă doreşte să sublinieze importanţa obţinerii producţiilor timpurii de tomate în solarii cu acoperire dublă, în condiţiile specifice Podişului Transilvaniei cu referiri directe la producţia cantitativă şi calitativă obţinută. Cultura experimentală a fost înfiinţată în anul 2007 în cadrul câmpurilor experimentale aferente Disciplinei de Legumicultură, Facultatea de Horticultură, Cluj-Napoca, România. Experienţa a fost concepută bifactorial, factorii experimentali fiind următorii: materialul biologic folosit (Cronos F1 (mt.), Menhir F1, Shannon F1), desimea de plantare (80/40 cm - 31.250 plante/ha (mt.), 80/30 cm - 41.700 plante/ha). Toate variantele experimentale au fost mulcite cu folie neagră de polietilenă şi s-a aplicat fertirigarea prin picurare. Cel mai mare procent de legare a fost înregistrat la varianta experimentală Menhir F1 31.250 plante/ha. Dinamica recoltărilor a avut cele mai mari valori la variantele experimentale reprezentate de Cronos F1 41.700 plante/ha. Cea mai mare proporţie de fructe de calitate Extra a obţinut-o varianta Shannon F1 41.700 plante/ha (85.90 % fructe de calitatea Extra). Influenţa combinată dintre densitatea de plantare şi materialul biologic folosit arată că cele mai mari producţii se întâlnesc la varianta experimentală Cronos F1 cu densitatea de 41.700 plante/ha (20.46 kg/m^2).*

MATERIAL AND METHODS

The experimental field was founded in 2007 in the vegetable growing sector at the Faculty of Horticulture Cluj-Napoca, Romania. The experiment was conceived as a bifactorial one. The experimental factors where: **biological material used** (Cronos F1 tomato hybrid (control), Menhir F1 tomato hybrid, Shannon F1 tomato hybrid), **plant density** (80/40 cm - 31.250 plants/ha (control), 80/30 cm - 41.700 plants/ha)

From the combination of the two factors resulted 6 experimental variants placed in 3 repetitions.

The experiment was founded in 3.04.2007, when the transplants where planted. Before the plantation the drip irrigation system was mounted and the soil was mulched with a black plastic film.

Concerning the environmental conditions, the experiment was placed in a modern plastic tunnel double covered with Visquen UV 5 plastic film. The length of the plastic tunnel was 32 m, and 8 m wide. The surface of an experimental variant was established at 4.80 m^2. The plastic tunnel was equipped with a fertirigation system, artificial fog system and an automatically opening and closure system for the windows.

In the pedoclimatic conditions of the Transilvanian Tableland the early yield was established between 15.06.2007 – 28.06.2007.

The experiment was dismounted in 3.09.2007.

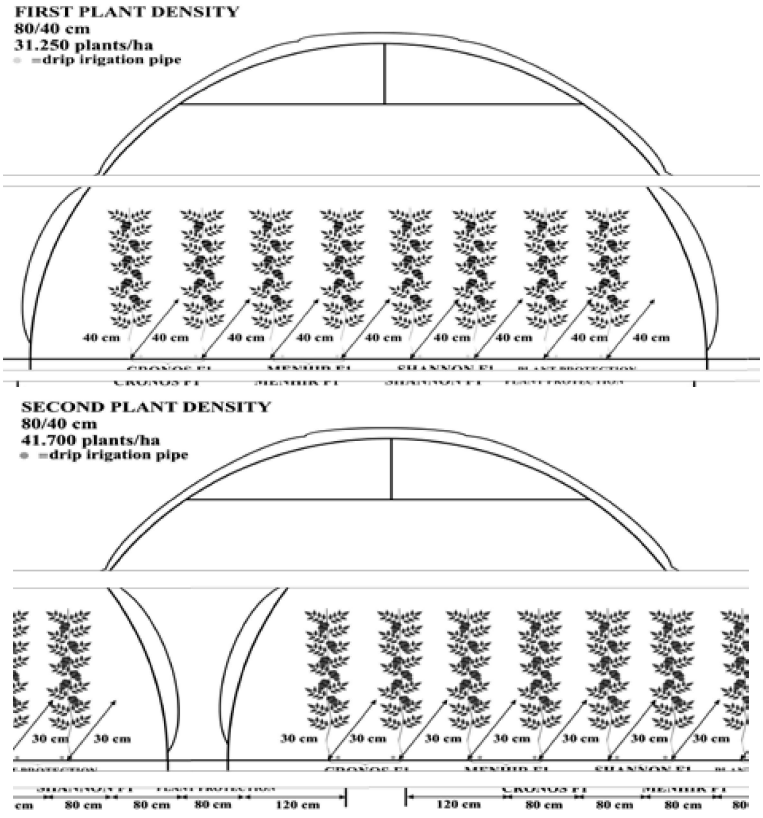

Fig.1. **Plant densities used in the experiment**

RESULTS AND DISCUSSIONS

The medium height of the tomato plants is larger an all experimental variants cultivated under the density of 41.700 plants/ha, where the self shading effect is more pregnant. Blossom and fruit link between clusters 1-3 is higher for the experimental variant Menhir F1 31.250 plants/ha (90.79 % fruit link). The same experimental variant had the highest fruit link between clusters 4-8 (54.84 % fruit link) and a medium fruit link/plant of 71.30 %. (Table 1)

The highest yield dynamic was observed at the Cronos F1 41.700 plants/ha experimental variant with a value of 3.24 kg/m^2 in June; 11.7 kg/m^2 in July and 6.53 kg/m^2 in August for the experimental variant Shannon F1 80/40. The highest total yield was recorded at the Cronos F1 80/30 experimental variant, with a value of 20.5 kg/m^2. (Fig. 1)

Overall, all the experimental variants planted at the larger plant density recorded higher total yields. (Fig. 1)

Table 1

Blossom and fruit link for the cultivated tomatoes (Cluj-Napoca, Romania 2007)

Experimental variant	Medium height of plants (cm)	Medium no. of leaves	Medium no. of clusters	Fruit link between (clusters 1-3) (%)	Fruit link between (clusters 4-8) (%)	Total fruit link (%)
V1	177.77	22.55	6.11	88.64	50.50	68.45
V2	180.55	23.66	6.22	85.08	43.46	64.10
V3	217.77	26.10	7.22	**90.79**	**54.84**	**71.30**
V4	221.11	25.77	6.88	90.00	51.00	68.43
V5	239.99	28.55	7.33	82.35	48.88	63.29
V6	245.55	28.11	7.10	77.92	40.28	56.45

V1 = Cronos F1 31.250 plants/ha (control)
V2 = Cronos F1 41.700 plants/ha
V3 = Menhir F1 31.250 plants/ha
V4 = Menhir F1 41.700 plants/ha
V5 = Shannon F1 31.250 plants/ha
V6 = Shannon F1 41.700 plants/ha

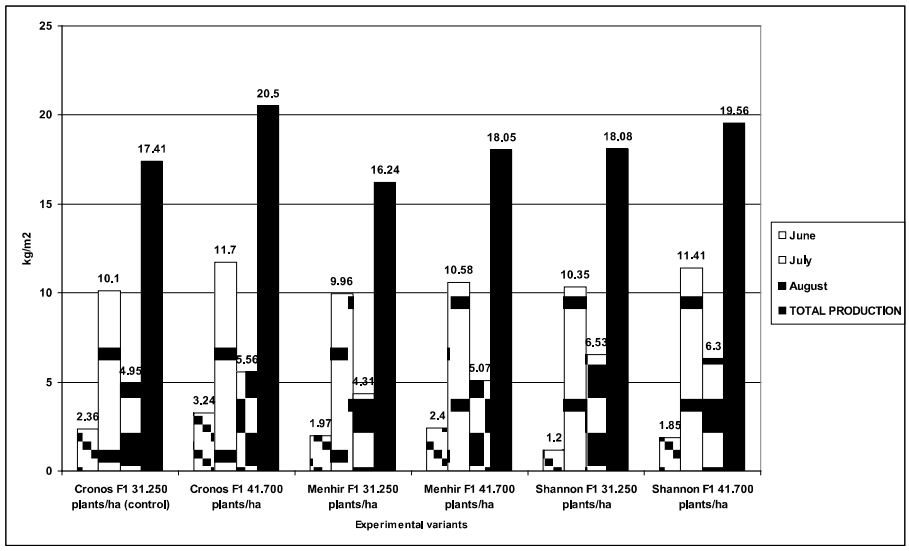

Fig.1 - Yield dynamic for the cultivated tomato plants (Cluj-Napoca, Romania 2007)

The highest percent of extra quality fruits from the total yield was obtained at the Shannon F1 41.700 plants/ha experimental variant (85.90 %). The same experimental variant had the highest percent of extra quality fruits + first quality fruits (98.90 %). (Fig.2)

Even if the highest total yield was obtained at the Cronos F1 41.700 plants/ha experimental variant (20.5 kg/m^2), the qualitative variant seems to be Shannon F1 41.700 plants/ha with a total yield of 19.23 kg/m^2. (Table 2 and Fig. 2)

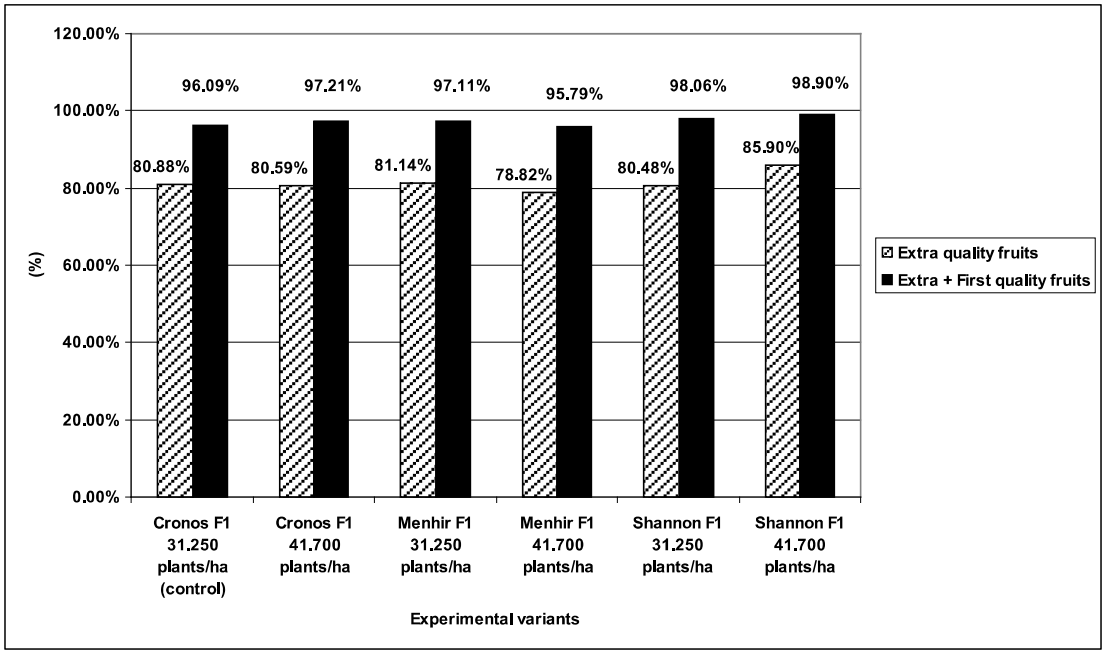

Fig.2 - Quality of the tomato yield obtained in a modern plastic tunnel (Cluj-Napoca, Romania 2007)

Table 2

The combined influence between plant density and used cultivars upon the total medium yield of tomato plants (Cluj-Napoca, Romania 2007)

Plant density + Used cultivar	Total medium yield (kg/m^2)	Relative total yield in comparation with the control	Difference ($\pm kg/m^2$) compared with the control	Relative total yield in comparation with the average	Difference ($\pm kg/m^2$) compared with the average
V1	17.42	100.00	0.00 $^{-}$	95.39	-0.84 $^{-}$
V2	**20.46**	117.45	3.04 **	112.04	2.20 *
V3	16.28	93.45	-1.14 $^{-}$	89.15	-1.98 ^{0}
V4	18.09	103.84	0.67 $^{-}$	99.06	-0.17 $^{-}$
V5	18.09	103.84	0.67 $^{-}$	99.06	-0.17 $^{-}$
V6	19.23	110.39	1.81 *	105.31	0.97 $^{-}$
Average	18.26			100.00	0.00

DL (p 5 %)	1.67
DL (p 1%)	2.53
DL (p 0.1 %)	4.06

V1 = Cronos F1 31.250 plants/ha (control)
V2 = Cronos F1 41.700 plants/ha
V3 = Menhir F1 31.250 plants/ha
V4 = Menhir F1 41.700 plants/ha
V5 = Shannon F1 31.250 plants/ha
V6 = Shannon F1 41.700 plants/ha

The combined influence between plant density and used cultivars reveal a distinct positive significance for the experimental variant Cronos F1 41.700 plants/ha (V2) compared with the experimental control, and a significant positive difference for the V6 experimental variant (Shannon F1 41.700 plants/ha) compared with the average of the experiment. (Table 2)

The increase of production was 17.45 % at V2 experimental variant, compared with the experimental control, and 12.04 % compared with the average of the experiment. (Table 2)

The V2 experimental variant compared with the average of the experiment has a significant positive difference.

The lowest total yield was obtained at the V3 experimental variant (16.28 kg/m^2) (Menhir F1 31.250 plants/ha)

CONCLUSIONS

1. All the experimental variants planted at the larger plant density 41.700 plants/ha recorded higher medium heights of plants, where the self shading effect is more pregnant.

2. The highest values for fruit link where obtained at the experimental variant Menhir F1 31.250 plants/ha, conducting to the idea that this plant density assures a better fruit link.

3. Overall, all experimental variants plated at the density 41.700 plants/ha obtained the highest percent of Extra quality fruits and highest total yields, with the recommendation for adopting this plant density, mulching of the soil with black plastic film and drip fertirigation.

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