RESEARCH REGARDING MANAGEMENT SYSTEMS FOR PLANTS WITH TWO STEMS, CULTIVATED IN SOLAR

CERCETĂRI PRIVIND CONDUCEREA PLANTELOR DE TOMATE CU DOUĂ TULPINI, CULTIVATE ÎN SOLAR

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Abstract. *The tomato plants were cultivated in solar, in extended cycle, managed with one stem as the classical plant management system for tomato, and with two stems, V shaped. The V shape was obtained by pinching the seedlings while planting them, removing only the growth top, and during the period when the shoots appeared, the first two shoots from the base of the plants were maintained, the rest of them being removed. The two shoots were individually supported on strings, V shaped, in order for the light to better penetrate to the plants. During the vegetation period, specific maintenance works were applied, with the observation that they were applied on agrotextile soil with mulch purpose and five phasal fertilizations, locally with Universol 18-11-18, 200 ml/pl, with a concentration of 1,5 %. The scheme of the experiment: V1- control, managed with one stem, at 80 cm / 40 cm , realizing a density of 31 250 pl/ha; V2 – plants managed with two stems, at 100 cm /40 cm, realizing a density of 25 000 pl/ha. After the interpretation of the results it could be observed that the plants managed with two stems behavied very well both from the point of view of vegetative growth and from the point of view of fructification. The fruit production calculated per plant was 3,8 kg for the plants managed with one stem and 6 kg for the plants with two stems. The production per meter square was 11,9 kg for the one stem variant and 15,1 kg for the two stem variant. From the point of view of the size of the fruit measured by weight, most of them were in the 100 – 150 g category, 35 % respectively 38 %, followed by the under 100 g category.*

Key words: protected areas, tomato plants with two stems, production, quality.

Rezumat. *Tomatele au fost cultivate în solar, în ciclu prelungit, conduse cu o tulpină ca în sistemul clasic de conducere al tomatelor şi cu două tulpini, în formă de V. Forma de V a fost obţinută prin ciupirea răsadului în momentul plantării, îndepărtând numai vârful de creştere, iar în momentul în care au apărut lăstarii, s-au lăsat primii doi de la baza plantei, restul fiind îndepărtaţi. Cei doi lăstari au fost palisaţi individual pe sfori, în V, în scopul pătrunderii cât mai bine a luminii la nivelul plantelor. Pe parcursul perioadei de vegetaţie s-au aplicat lucrări de întreţinere specifice, cu menţiunea că s-a aplicat pe sol agrotextil cu rol de mulci şi 5 fertilizări faziale, locale cu Universol 18-11-18, câte 200 ml/pl, în concentraţie de 1,5%. Schema experienţei: V1- martorul, condus cu o tulpină, la 80 cm/40 cm , realizând o desime de 31 250 pl/ha; V2 – plante conduse cu două tulpini, la 100 cm /40 cm, realizând o desime de 25 000 pl/ha. După interpretarea rezultatelor s-a putut observa că plantele conduse cu duoă tulpini s-au comportat foarte bine atât*

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din punct de vedere al creşterii vegetative, cât şi din punct de vedere al fructificării. Producţia calculată de fructe pe plantă, a fost de 3,8 kg la plantele conduse cu o tulpină şi 6 kg la plantele conduse cu două tulpini. Producţia la mp a fost de 11,9 kg la varianta cu o tulpină şi 15,1 kg la varianta cu două tulpini. Din punct de vedere al mărimii fructelor apreciate prin greutate, cele mai multe s-au încadrat în categoria 100 – 150 g, 35 % respectiv 38 %, urmate de categoria sub 100 g.

Cuvinte cheie: spaţii protejate, tomate cu mai multe tulpini, producţie, calitate

INTRODUCTION

Tomato culture in various ways still represents a challenge for those working in this field, being a species that easily adapts and positively reacts to the factors to which it is exposed, without exceeding certain limits. Plant management system with two stems is a challenge, being determined on one side by the rather high cost of hybrid seeds and on the other side by the capitalization as high as possible of the environmental factors that still exist. Plant management system with two stems is possible by maintaining the first offspring from the base of the plant, (Indrea D., 2007) that will play the role of a stem, variant accepted by when inside the culture gaps that cannot be filled appear, by pinching the plants in the seedling phase or by cutting the stems at 30 cm above soil, at the end of the first cycle, in order to pass to the second cycle, anticipating the production (Schutz Maria, 2010). In this last case, usually only one stem is maintained, which comes from a more vigurous shoot that appears on the portion of the stem which is maintained and which will anticipate the obtaining of the harvest in the second cycle.

For a superior capitalization of the environmental factors, especially the light, the plants can be alternatively managed along the row, in V shape (Hoza Gheorghiţa, Soare Anca, 2010).

MATERIAL AND METHOD

The research was conducted at the Faculty of Horticulture in Bucharest, using the Romanian hybrid created at the Vegetable Center Buzau, Siriana F1.

Siriana F1 is an early hybrid, with undetermined growth, destined to cultivation in protected areas and open field. The fruit has an average weight of 120–180 g and an uniform red color. It produces 3–3,5 kg/plant/5 level and has a good transportation resistance.

The culture wad founded in solar with two variants:

- V1- control, managed with one stem, at 80 cm / 40 cm, realizing a density of 31 250 pl/ha
- V2 – plants managed with two stems, at 100 cm /40 cm, realizing a density of 25 000 pl/ha

The two stems were obtained by pinching the growth top of the seedling during planting, leaving the two shoots appeared at the base of the plant, the rest being removed. Each stem was supported on a string, in V shape, in order to ensure better lighting for the plants. During the vegetation period, the culture was maintained by specific solar works, respectively irrigation, mulching the soil with agrotextile, local fertilization with solution of Universol 18-11-18, five times during the vegetation period, 200 ml/pl, with a concentration of 1,5 %. Observations and measurements were made regarding the height of the plants, distance until the point of insertion of the shoots, recording the production, determination of average fruit weight, calculating the absolute and relative production, measuring the size of the fruit and framing them into weight categories.

RESULTS AND DISCUSSIONS

The research being conducted in solar, on tomato plants regarding the plant management systems, showed that the plants react very well to the management system with two stems, being a vigurous species and with a very good capacity to support a high load of fruit.

Analyzing the fruit from the point of view of the biometric characteristics, it can be observed that Siriana variety behaved very good. Thus, the distance from the parcel to the first inflorescence from the first shoots that after that became stems was very close for the two variants studied, the difference being very small and influenced by the variety and obviously larger, respectively 58 and 59 cm, comparative to the insertion point of the first inflorescence from the main stem which for Siriana is around 30-35 cm. An important aspect recorded was that the distance until the point of shoot insertion was relatively small, 25 and respectively 27 cm. The plants recorded an increase in height of 1.8m, being managed in extended cycle (table 1).

Table 1

Biometric characteristics

Variant	Average plant height, cm	Distance from the parcel to the first inflorescence from the left shoot, cm	Distance from the parcel to the first inflorescence from the right shoot, cm	Distance until the point of shoot insertion, cm	
				left	right
V1 – control	1.86	-	-	-	-
V2	1.83	59.3	58.4	25.2	27.3

Plant management system influenced the fruit production, both per plant and per unit of area. Regarding the average production obtained per one plant, it was observed that for the plants conducted with one stem it was 3.8 kg. for the plants conducted with two stems, the production was 3.1 kg on one stem and 2.9 kg on the other stem, and 6 kg per plant. The fruit production per meter square was influenced by the number of stems with which the plants were managed, thus for the variant with one stem 11.9 kg were obtained, and for the variant with two stems the production per m^2 was 15.1 kg, on one stem being obtained 7.8 kg, and on the other 7.3 kg (table 2).

Table 2

The fruit production

Variant	Stems number	Production, Kg/pl	Difference compared to the control		Signifi-cance	Production, kg/m^2
			kg/pl	%		
V1	1	3.8	-1.1	77.55	oo	11.9
V2	2	6.0	1.1	122.44	**	15.1
Average	-	4.9	-	100	control	13.5

DL 5% - 0.24 kg/pl
DL 1% - 0.53 kg/pl
DL 0.1% - 1.82 kg/pl

Regarding the difference in the recorded production for the two stem variant, compared to the variant with one stem, the production was of +2.2 kg/pl, and as a

percentage of + 58 %. The production per m^2 was of + 3.1 kg for the two stem variant and as a percentage of +27 % (table 2). The obtained data was statistically ensured.

The quality of the tomato fruit, expressed by weight, was an important indicator in the ongoing of the research. Thus, the Siriana variety was noticable for its fruit of large to medium size, in the over 200 g category, having fruit of 243g and respectively 245 g, 6 % for the control and 10 % for the two stem variant. Most fruit were in the 100-150 g category, 35 % for the control and 38 % for the two stem variant (table 3, 4).

Table 3

Measuring the size of the fruit, g

Variant	Average fruit weight, g	Average on weight category, g			
		>200	150-200	100-150	<100
V1 control	117	245	166	118	66
V2	118	243	162	124	52

Table 4

Fruit percentage, on size categories %

Variant	Fruit size categories, g			
	>200	150-200	100-150	<100
V1 control	6	23	35	36
V2	10	24	38	28

CONCLUSIONS

Tomato plant management system with more stems is a technological variant to reduce the number of shoots per unit of area. From the conducted research, it can be concluded that it is a good management system for tomato plants, because:

- The number of seedlings needed for founding the culture was reduced from 31250 pl/ha for the one stem variant to 25 000 pl/ha for the two stem variant, which represents a reduction of 6250 pl/ha, meaning 20 %, according to the chosen planting scheme;
- The plants presented a very vigurous vegetative growth measured by plant height, which was on average 1.83-1.86 m and very rich foliage;
- Very good fructification capacity, measured by production per plant, which was 3.8 kg/pl for the one stem variant and 6 kg/pl, for the two stem variant, but also by production per m^2, which was 11.9 kg for the one stem variant and 15.1 for the two stem variant;
- The fruit reached an average weight of 117-118 g, most of them being in the 100-150g size category, 35 %, respectively 38 %, followed by the under 100g category.

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