RESEARCH ON THE BEHAVIOUR OF SOME TOMATO VARIETIES IN ECOLOGICAL CULTURE CULTIVATED UNDER POLYETILENNE TUNNEL CONDITIONS

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Abstract

Tomatoes are one of the major vegetable crops grown in polyetilenne tunnel conditions and in the field. Also occupies an important place regarding to consumption, both in Romania and worldwide. The abundance of existing varieties and hybrids allowed numerous experiences concerning on their analysis regarding to yield and quality in the polyetilenne tunnel conditions and in the field.

Key words: ecological crop, varieties, tomato, polyetilenne tunnel conditions

INTRODUCTION

In Europe, unlike other vegetables, tomatoes were cultivated only in the late nineteenth century, although in Mexico have been used since 200 BC center of origin of tomatoes is around settlements Vera Cruz and Pueblo, are known hundreds of years before the discovery of America (Jekins 1948). Rapid growth of tomatoes, especially after the World War II was due to growing demand in the market, the high content of vitamins, mineral salts, sugars, amino acids, organic acids and naturally balanced pleasant taste.

According to the Statistical Yearbook F.A.O. 2007 global yield of tomatoes is 125 million tons and a cultivated area of 4 million hectares, in China is cultivating 1.455 million ha. The highest consumption of tomatoes per capita and per year in Greece (115 kg / inhabitant / year). Because is a species located at the head of vegetables the researches in the field are very numerous. It was getting varieties with a high content of lycopene, with high content of vitamin C, were obtained varieties of fruits with varied colors, even blue (achieved from Oregon State University).

The roots explores an soil volume of 8 m^3 for 9 m^2 surface if the distance of sowing allows (Nisen 1993). In terms of normal temperature roots of young plants grow 2-7 m / day (Lehman 1953, Brejnev 1944). Currently especially in protected areas using either grafted tomatoes or culture without soil. Tomatoes have relatively high requirements for

vegetation factors and the existence of a large palette of varieties increased the researches in this direction.

The minimum temperature for seed germination is 10 ° C depending on the variety. The optimum temperature is 24 ° C (Aung, 1979, quoted by Petrescu 1992). Stan N (1975) affirmed that lower temperatures in the seeLSDing stage causes an increase of the number of inflorescence buds flowering and a decrease of the number of leaves until the first inflorescence. Calvert (1964) shows that in the inadequate improving conditions, the time to maturation of floral organs is higher, and fructification is delayed.

Regarding humidity, researches from Research Stations from Cioplan and Işalnița showed that in the first period of vegetation till starting fruiting, optimum soil moisture is 65-70% from field capacity of soil water for the fruiting period to increase to 75-80%. Decreasing of atmospheric humidity below 45% accentuating the longistilie phenomenon and slows the pollination and fruit binding (Coyne quoted by Butnaru 1970) and increases more losses through sweat. Rational fertilization of the crop along with located in a favorable soil for culture have a great importance for successful of the culture.

Optimal content of leaf in nitrogen corresponding to a good supply is 0.3-0.4% (Krepbil and Krauss, 1962).

Deficiency in phosphorus determining a poorly developed root system; abortion of flowers, appear leaves with violet shades; fructification is low, the fruit breaks where in cling to stalk (Davidescu D., Davidescu Velicia, 1992). Potassium has effect on fruit quality (taste, color) and resistance to disease (Benem, 2004). Magnesium influences the fruit quality, resistance to transport and storage (Winsor 1961).

The types of varieties and hybrids are very rich, known worldwide over 500 varieties of tomatoes.

MATERIAL AND METHOD

The appearance on the market in the last two decades of a large range of varieties and hybrids of tomato led to orientation of growers towards highly productive varieties resistant to transport but with very poor taste qualities, as recorded by a large number of consumers. This paper aims to analyze several varieties of tomatoes in terms of earliness and yield potential and quality of fruits. The seeds are organic certified.

Biological material was represented by 8 tomato varieties namely: Cristal F1 control variant, early variety cultivated in 1998 in micro farm, red at maturity. Also with red fruit were Estiva and Beef Stek varieties. At Carotina and Carotina de Plovdiv have yellow - orange fruit and Ananas

yellow orange with pink tones. Potiron Ecarlate and Rose de Berne have pink color.

Experience with a single factor was placed in a vegetable micro farm organic certified from Husasău de Tinca (NW Romania) in 2014. In a polyetilenne tunnel about 530 m^2 was fitted comparative culture of competition with 8 variants in three repetitions. Each variant had 30 plants; experimental plots were arranged in subdivided blocks method.

Data were processed by analysis of variance. Experience is a first phase; following next the fruits will be analyzed after chemical composition.

RESULTS AND DISSCUSIONS

Tehnologia de cultură în cazul culturii experimentale a fost tehnologia ecologică a tomatelor cultivate în solarii.

Crop technology for experimental culture was ecological technology of tomatoes cultivated under polyetilenne tunnel conditions.

Table 1

Earlier yield at tomato crop

Husasău de Tinca 2014

No.	Variant	Absolut yield Kg/m^2	Relative yield %	±d Kg/m^2	Semniffication
1	Cristal F_1 Mt	2.87	100	0.00	-
2	Estiva	2.39	83.27	-0.48	00
3	Beef Stek	2.03	70.73	-0.84	000
4	La Carotina	2.26	78.74	-0.61	00
5	Carotina de Plovdiv	3.44	111.86	0.57	**
6	Ananas	4.96	68.29	-0.91	000
7	Potiron Ecarlate	4.84	64.11	-0.03	000
8	Rose de Berne	3.24	112.84	0.37	*

The first aspect analyzed for the 8 varieties of tomato studied was early production. This gives the possibility to establish the moment of appearance of the first harvest for each variety. The data relating to the early production of tomato are shown in Table 1. In contrast to the variety Cristal, which is semi-early, only 2 varieties have been shown to be the earliest Rose de Berne and Carotina de Plovdiv. In the case of Rose de Berne variety was registered an early gain yield of 12.89%, the difference from the control variant was significantly positive statistically. The higher early yield was obtained at Carotina de Plovdiv variety (3.44 kg / m^2) with 5.7 t / ha more than the variety Cristal, difference positive significant statistically. From the varieties studied, the variety Potiron Ecarlate was the late one, variety that obtained early yield only by 64.11% from the control

variant. The difference was statistically highly significant negative. Variety Ananas and Beef Stek are also quite late. Ananas variety obtained with 9.1 t / ha less than the control variant respectively with 8.4 t / ha at variety Beef Stek. Both varieties had differences statistically very significant negative. Productive potential of each variety from the study is presented in Table 2.

Table 2

Total yield registered at tomato crop

Husasău de Tinca 2014

No.	Variant	Absolut yield Kg/m^2	Relative yield %	±d Kg/m^2	Semniffication
1	Cristal F_1 Mt	5.64	100	0.00	-
2	Estiva	6.32	112.05	0.68	*
3	Beef Stek	6.46	114.53	0.82	*
4	La Carotina	5.21	92.37	-0.34	-
5	Carotina de Plovdiv	5.06	89.71	-0.58	-
6	Ananas	6.12	108.51	0.48	-
7	Potiron Ecarlate	6.89	122.16	1.25	*
8	Rose de Berne	5.37	95.21	-0.27	-

LSD 5% = 0.67
LSD 1% = 0.93
LSD 0.1% = 1.33

In general all varieties studied have a relatively high yield potential ranging from 50.1 t / ha and 68.9 t / ha. The higher yield of tomato was obtained at variety Potiron Ecarlate with a gain yield of 22.16% compared with control variant. The difference was statistically significant distinct positive. The varieties Beef Stek and Estiva registered 6.8 t / ha respectively 8.2 t / ha at variety Breef Stek, more fruits than Cristal variety. Differences were significantly positive statistically. Even the varieties La Carotina, Carotina de Povdiv and Rose de Berne obtained lower yields compared with control variant; the difference did not exceed 5% not statistically assured. It was the same in the case of variety Ananas but this registered superior yield compared with control variant.

Tomato fruit quality is shown in Table 3. All harvested fruits were passed in 3 qualitative steps, analysis being done for each variety in both absolute and relative yield. In general at all varieties analyzed fruits had a good quality, as evidenced by the fact that over half of the total yield of tomatoes were extra quality even if in some varieties in absolute yield extra quality represents a low percentage from total yield.

Table 3

Quality of tomato fruits

Husasău de Tinca 2014

No.	Variant	Total yield Kg/m^2	Extra quality from total		Ist quality from total		IInd quality from total	
			Kg/m^2	%	Kg/m^2	%	Kg/m^2	%
1	Cristal F_1 Mt	5.64	3.87	68.61	1.28	22.69	0.49	8.68
2	Estiva	6.32	4.69	74.20	1.15	18.19	0.48	7.59
3	Beef Stek	6.46	3.75	58.04	1.97	30.49	0.74	11.45
4	La Carotina	5.21	2.62	50.28	1.63	31.28	0.96	18.42
5	Carotina de Plovdiv	5.06	2.97	58.69	1.23	24.30	0.86	16.99
6	Ananas	6.12	3.88	63.39	1.35	22.05	0.89	14.54
7	Potiron Ecarlate	6.89	3.92	56.84	2.12	30.76	0.85	12.33
8	Rose de Berne	5.37	2.74	51.02	1.82	33.89	0.81	15.08

In the case of yield with extra quality was noticed the variety Estiva with a percentage of 74.10% of the total, followed by control variant with 68,61%. At this stage the quality had poor behavior at Rose de Berne variety only 51.02% of the total. That quality fruits were between 18, 19% at Estiva variety and 33.89% at Rose de Berne variety. The fruits of IInd quality were represented very little from total yield.

CONCLUSIONS

Researches conducted at Husasău de Tinca regarding to analysis of tomato varieties grown in organically system under polyetilenne tunnel conditions has permitted some conclusions:

1. Ecological culture of varieties of tomatoes under polyetilenne tunnel conditions using certified organic varieties manages to realize yields close to conventional tomato crop.
2. Except the varieties Carotina de Plovdiv and Rose de Bernetoate studied had lately yield than Cristal variety the control variant of experience.
3. The latly variety was Potiron Ecarlate barely got a early production of 64.11% from control variant yield.
4. Potiron Ecarlate exceeded with 12.5 t / ha compared with yield from variety Cristal.
5. For all varieties extra quality accounted over 50% from total yield.

6. Variety Estiva detached from the others in terms of fruits quality, fruits with extra quality and Ist quality summed it exceeded 90% from total yield.

REFERENCES

1. Apahideanu al. S., Maria Apahideanu, 2001, Legumicultură specială. Editura Academic Pres, Cluj-Napoca
2. Apahidean Al. S., Maria Apahidean, 2004, Cultura legumelor şi ciupercilor, Academic Press, Cluj-Napoca.
3. Bondar J., Garton R.W., 1994, Production de tomates de consommation en frais. Internet.
4. Calvert A., 1966, Temperature requirements of the young tomato plant. Acta Horticulturae 4.
5. Cernahoski, 2000, Cultura tomatelor în sere şi solarii. Hortinform, 2.
6. Chaux Cl., Foury Cl., 1994, Productions legumieres vol.I-III, Lavoisier, TEC/DOC, Paris.
7. Davidescu D., Velicica Davidescu, 1992, Agrochimia Horticolă. Editura academiei, Bucureşti
8. Dumitrescu M. şi colab., 1998, Producerea legumelor. Editura Ceres, Bucureşti.
9. Horgoş A., 1999, Legumicultură specială. Editura Mirton, Timişoara.
10. Indrea D. şi colab., 1980, Contribuţii la stabilirea epocii de plantare şi a sistemului de conducere a tomatelor în seră. Buletin IACN, 34, Seria agricultură.
11. Indrea D. şi colab., 1983, Legumicultură. Editura Didactică şi Pedagogică, Bucureşti.
12. Lăzureanu A. şi colab., 1998, Agrotehnică. Editura Risoprint, Cluj –Napoca.
13. Maier I., 1969 – Culutra legumelor. Editura Agro-silvică, Bucureşti.
14. Petrescu, C., Popescu, V., 1992, Tomatele, în Legumicultura de Butnariu H. şi colab., EDP, Bucureşti.
15. Popescu Gh., 2001, Patologia plantelor horticole. Editura Eurobit, Timişoara.
16. Popescu V.,1996, Legumicultură. Vol.I. Editura Ceres, Bucureşti.
17. Popescu V., Horgoş A., 2003, Tratat de legumicultură. Editura Ceres, Bucureşti.
18. Stan N.,1975, Studiul diferenţierii mugurilor floriferi la tomate, Teză de doctorat, Institutul Agronomic, Bucureşti.
19. Stan T. N., Stan N. T., 1999, Legumicultură, Vol.I., Editura Ion Ionescu de la Brad, Iaşi.
20. Victor Renaud et Ch.Duduet. 1988, Le potager par les methodes naturelles.
21. Voican V., 1972, efectul intensităţii luminii asupra creşterii şi dezvoltării asupra unor specii legumicole.
22. Voican V., Lăcătuş V. 1998, Cultura protejată a legumelor în sere şi solarii. Ed. Ceres, Bucureşti.
23. Anuarul Statistic al României, 2003.
24. Anuarul F.A.O.,2006.