

RESEARCH ON THE DEVELOPMENT OF ALTERNATIVE TECHNOLOGIES FOR THE PRODUCTION OF TOMATO SEEDLINGS IN DRĂGANU ARGEȘ

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Abstract

This paper aims to find the most efficient techniques for the production of seedlings because it represents one of the greatest concerns of the vegetable growers, being a subject of great interest. A special attention shows determining influence of different pots, plastic or biodegradable, on the growth and development of tomato seedlings.

The replanting of the seedlings was carried out in various pots (of polyethylene film, from peat, Jiffy pots, small and big alveolar pallets) filled with nutritional mixture.

The best growth in height was achieved in seedlings transplanted in polyethylene pots (B1), except for Parris hybrid, the favorable effects on seedlings growth being explained by their better nutritional capacity as a result of the development of a stronger root system. As a type of pot, it is noted that seedlings transplanted into large alveolar pallets formed floral buds before planting in all hybrids studied. The type of pots used to transplant seedlings, and especially their size, positively influences the number of leaves.

This work brings to the forefront the influence of different pots of plastic or biodegradable material on the growth and development of tomato seedlings that have been transplanted and maintained in these pots until planting.

Keywords: pots, seedlings, tomato.

1. INTRODUCTION

Finding the most effective seedling techniques is one of the biggest concerns of vegetable specialists, being a topical issue, both in our country and in the world.

Ensuring seedling of superior quality is a determining factor of production in terms of quantity, quality and precocity, knowing that in vegetable culture appearing first on the market impose the price of capitalizing of production and therefore they had extremely favorable financial results (Dobrin, 2005).

Tomatoes occupy the largest crop area in the country and due to the staggering of production throughout the year, by cultivating them both in the field and in protected areas (Ciofu et al., 2003). This species was chosen due to the special importance it represents in the culture and nutrition of the Romanian population.

Interested in stimulating plant growth and development, eliminating planting stress, harvest early, maintaining crop phytosanitary status by disorienting, banishing or reducing populations of pathogenic organisms below the economic threshold of damage, and storing products until delivery (Mușă (Uleanu), 2012).

The mixture of peat, compost and perlite produced the same results as peat and perlite mixture in terms of seedlings growth and development (Castillo et al., 2004).

Biodegradable nutrients based on cellulosic fibers and peat are the best transplanting solution currently used in planting plants (Epure et al., 2008) Biodegradable nutritive pots based on cellulosic and peat fibers with the addition of protective and stimulating materials are the top form of transplant currently used in seedlings technologies (Epure et al., 2008).

Tomato seedlings, treated correctly and at the right time, show great resistance to low temperatures and temperature shocks, as well as to lower humidity (Florescu et al., 1998).

The time to soften the seeds in vermicompost tea has positively influenced the germination of tomato seeds (Arancon et al., 2012).

2. MATERIALS AND METHODS

The experience was carried out in 2017 and was assembled in a farm specialized in seedlings production in Draganu, Arges County, in a solar-arbor of arched metal structure, covered with polycarbonate.

A bifactorial experience with tomatoes of type 3x5 has been assembled, totaling 15 experimental variants (table 1). 10 plants were used for each variant in three rehearsals.

Variable factors:

A. Tomato hybrid, with three graduations:

A.1 – Rila (figure 1);

A.2 – Parris (figure 2);

A.3 – Vanesa (figure 3);

B. Pot type, with five graduations:

B.1 - of polyethylene film (6/7cm);

B.2 – from peat (4,5/4,5 cm);

B.3 - Jiffy pots (3,5/3,5cm);

B.4 - small alveolar pallets (4,5/5 cm);

B.5 - big alveolar pallets (6/7 cm).

Sowing was performed on February 29 in a peat-based nutrient substrate. The substrate temperature was 18 ° C, and the air temperature was 24 ° C.

The first seedlings appeared after 4 days, under the influence of elevated temperatures due to the heating system, and the percentage of 100% emerged tomatoes was reached after 8 days.

The replanting of the seedlings was carried out on February 18 in various pots filled with nutritional mixture. Care work that applied to seedlings began immediately after sowing and lasted until planting at the final site.

Table 1. Variable factors

Variant	Variable factors	
	A – Tomato hybrid	B – Pot type
V.1	A.1	B.1
V.2	A.1	B.2
V.3	A.1	B.3
V.4	A.1	B.4
V.5	A.1	B.5
V.6	A.2	B.1
V.7	A.2	B.2
V.8	A.2	B.3
V.9	A.2	B.4
V.10	A.2	B.5
V.11	A.3	B.1
V.12	A.3	B.2
V.13	A.3	B.3
V.14	A.3	B.4
V.15	A.3	B.5

*Figure 1. Rila F1 Hybrid in all 5 types of pots**Figure 2. Parris F1 Hybrid in all 5 types of pots*



Figure 3. Vanesa F1 Hybrid in all 5 types of pots

At planting, the seedling age was 55 days and present: a radicular white system and uniformly spread throughout the substrate mass of the pots; 5-8 true dark green leaves; 3-5 mm thick on the package; 13-19 cm high; the first inflorescence formed (primordia).

In this experience, observations and determinations were made regarding the temperature level of the seedlings production area, the plant height increase, the number of leaves per plant and the appearance of the first floral buds. We determined the plant growth rate by measuring 5 to 5 days from 8 February to 3 April when the seedlings were planted in the solar.

3. RESULTS AND DISCUSSIONS

Until planting, the **temperature** inside the solar was monitored according to the table 2.

Table 2. Temperature regime during the seedlings production period

Day	24 o'clock		3 o'clock		6 o'clock		13 o'clock		18 o'clock		Observations
	sol	aer	sol	aer	sol	aer	sol	aer	sol	aer	
30.01	22.3	15.5	20.5	11.2	20	15	25.1	42.3	22	35	Clear weather
2.02	21	13	21	13.7	21	14.9	27	40	22	34	
5.02	24	18	23	14.8	22	14.8	29	42	21	35	
8.02	23	15	22	15	22	14	29	43	21	34	
13.02	24	18	22	15	23	16	28	42	20	33	
15.02	23	16	23	17	23	17	29	40	18	32	
18.02	20	12.5	23	12	22	13	25	38	20	31	
23.02	23	12	20	10	20	10	25	39	20	32	
25.02	23	13	21	13	20	12	27	35	19	29	
28.02	20	13	20	13	20	13	26	32	18	27	Cloudy, with

4.03	15	11	19	11	17	14	25	29	17	17	rain
6.03	11	9	18	13	15	9	23	27	16	12	
9.03	9	7	7	6	8	5	22	19	16	11	
14.03	10	5	8	4	8	4	31	18	15	10	
16.03	10	8	9	6	8	5	30	18	14	10	
19.03	15	8	10	7	8	5	21	20	19	18	
24.03	20	15	19	14	18	14	29	32	24	19	Clear weather
26.03	23	18	23	15	23	15	27	35	24	21	
29.03	24	17	23	14	23	14	28	35	25	21	
01.04	23	15	22	15	22	14	28	36	25	22	
03.04	24	15	23	14	23	14	29	39	26	23	

In vegetable cultivation for harmonious plant development, different from daytime to night temperature should not exceed 5° C. For this reason it was necessary to supplement the heat in the cool period.

Table 3. Plants growth dynamics

Date	Plants growth dynamics														
	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
8.02	1.7	2.3	2.1	2.4	2.5	1.6	2.3	1.7	2	1.7	1.7	1.8	1.6	1.5	1.5
13.02	5	5.2	5.2	5.3	5.5	4.8	5.4	5.1	5.3	5	4.4	4.5	4.3	4.2	4
18.02	8.1	8.5	8.4	8.5	8.7	7.9	8.5	8.2	8.5	8.1	7.6	7.8	7.5	7.3	7.1
23.02	7.7	8.9	8.7	9	9.1	7	8.4	6.7	8.6	7.8	7.5	6.7	6.1	5.9	5.7
28.02	8.5	9.5	9.4	9.7	9.8	7.7	9.6	7.5	9.1	8.2	8.1	7.3	6.9	6.5	6.4
4.03	12.5	11.7	11.5	11	11.5	10.4	12.9	9.4	13.5	11.6	10.5	10.7	9.5	10.4	8.5
9.03	12.7	12.4	11.8	11.5	11.9	11.3	13.2	10.3	13.7	12.4	11.5	11.4	9.8	10.5	9.2
14.03	13.8	13	12.5	11.9	13	12.5	13.5	11.8	14	13.1	13	12.2	11.5	11.6	10.8
19.03	14.5	13	12.5	12	13.4	12.8	13.5	12.4	14.2	14	13	12.2	11.6	11.6	10.9
24.03	16.1	13.2	13.2	12	14.8	12.9	13.5	12.5	15	14.9	13.5	12.2	11.7	11.6	11.3
29.03	16.5	14	13.7	12	15.3	13.2	13.5	12.8	15.8	15	14.8	13.4	12.5	13	12.8
3.04	18.5	15	14.8	13	15.4	13.8	13.8	15	17.5	16	18	14.5	14	15.5	14.5

Analyzing the data from table 3 it is observed that at the first measurements made there are no significant differences in height increase between the variants under study.

Thus, initially, the growth of seedlings is not influenced by the type of pot or the nutrient substrate it contains.

Rila F1 showed the best height increase in seedlings transplanted in polyethylene pots (B1) and the weakest in those transplanted in small alveolar pallets (B4).

Parris F1 showed the best height increase in seedlings transplanted in small alveolar pallets (B4) and the weakest in those transplanted in peat pots (B2 and B3).

Vanesa F1 showed the best increase in seedlings transplanted in polyethylene pots (B1) and the lowest in those transplanted in jiffy-pots (B3).

The data on the number of leaves per plant and the appearance of the first floral buds (cells shaded in yellow) are presented in Table 4.

Table 4. Number of leaves / plant

Number of leaves / plant															
Date	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
8.02	2 cotyledon leaves														
13.02	2 cotyledon leaves														
18.02	3 true leaves														
23.02	4	3	3	3	4	3	4	3	4	4	4	3	4	3	3
28.02	4	3	4	4	4	4	4	3	4	4	4	3	4	4	3
4.03	5	4	4	4	5	4	5	4	5	5	5	4	5	4	3
9.03	5	4	5	5	5	5	5	5	5	6	5	4	5	5	4
14.03	6	5	5	5	6	6	5	5	5	6	6	4	6	6	5
19.03	6	5	5	5	6	6	5	5	5	6	6	4	6	6	5
24.03	7	5	6	5	6	4	3	6	4	5	6	4	6	4	5
29.03	7	5	7	5	7	5	3	6	6	5	6	5	7	5	5
3.04	8	6	7	5	6	5	3	6	6	8	8	7	8	6	7

The sudden rise in temperature during the day since March 20 has increased the demand for water. Due to water insufficiency, the measurements of March 24, the variants V6, V7, V9, V10, V14 were found to have lost 2 leaves.

The type of pots used to transplant seedlings and especially their size strongly influence the number of leaves.

Rila and Vanesa exhibited the highest values of the leaf number character on transplanted seedlings in polypropylene film pots and the lowest values in seedlings transplanted in smaller alveolar pallets.

Paris showed the highest values of the leaf / plant number in the transplanted seedlings in the larger alveolar pallets.

A maximum value is observed for the number of leaves per plant in the variants V1, V10, V11 and V13, thus it can be said that the Vanessa hybrid has the highest number of leaves.

The Parris Hybrid is most sensitive to water stress, with most variants showing the fall of the leaves.

At the March 24 measurements, floral blooms were found on variants V8, V9, V10 on March 29 at variants V1, V5, V11, and on April 3 and V15 (cells shaded in yellow in tabel 3).

By this we find that Parris F1 tomato hybrid is the earliest, and as a type of pot it is observed that seedlings transplanted into large alveolar pallets have formed floral buds before planting in all studied hybrids.

4. CONCLUSIONS

The edaphic volume of the nutrient substrate in the used pots in the seedling transplantation experiment does not directly influence the vegetative growth immediately after planting because the roots require a period of accommodation and resumption of root growth to explore the soil layer in which they were planted.

The best growth in height was achieved in seedlings transplanted in polyethylene pots (B1), except for Parris hybrid, the favorable effects on seedlings growth being explained by their better nutritional capacity as a result of the development of a stronger root system.

As a type of pot, it is noted that seedlings transplanted into large alveolar pallets formed floral buds before planting in all hybrids studied.

The type of pots used to transplant seedlings, and especially their size, positively influences the number of leaves.

It is recommended to use larger-sized plastic pots for the transplantation of tomato seedlings.

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