

---

# GERMINATION OF SOME TOMATO VARIETIES ON MINERAL WOOL SUBSTRATE

Ioan Vlad BENȚAN<sup>1</sup>, Oana Maria VIDICAN<sup>1</sup>, Mihaela CĂRBUNAR<sup>2</sup>, Ioana Teodora STANCIU<sup>1</sup>,  
Andrada Iulia IENCIU<sup>1</sup>

<sup>1</sup> University of Oradea, Faculty of Environmental Protection, Oradea City, Maghru 26, 410087, Romania Institution

<sup>2</sup> University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Mănăstur Street 3-5, 400372 Cluj-Napoca, Romania

---

## RESEARCH ARTICLE

---

### Abstract

Tomatoes are vegetables from the Solanaceae family, which are grown for their fruit, both fresh and for various processed products.

Recently, in Europe, there is a growing tendency for soilless or artificial soil grown vegetables.

The best performing rooting layers for this type of culture are: mineral wool, perlite and organic substrates consisting of peat and coconut fiber (VanOs et.al., 1999).

The study on the germination and replanting of cherry tomatoes, with mineral wool and vermiculite as substrate, was carried out in a vegetable farm in Tileagd, in 4 variants, with professional seeds.

---

**Keywords:** tomatoes; germination; growth LEDs; mineral wool;

#Corresponding author: [ienciu\\_andrada@yahoo.com](mailto:ienciu_andrada@yahoo.com)

### INTRODUCTION

Tomatoes are native to Central and South America. According to Jenkins, 1948, cited by Indrea et al., 2009, the center of origin of tomatoes is in the vicinity of Vera Cruz and Pueblo, being reported as ornamental plants since 1498 by Christopher Columbus.

Tomato fruits contain 5.5-7.5% fat, represented by carbohydrates 3-4%, proteins 1-1.3%, organic acids 0.3-0.5%. They are known by their high content of vitamins: carotene (0.8mg), B1, B2, B6 (0.1mg), C(15-30mg), K (24mg) and mineral salts: potassium (280mg), phosphorus (24-40mg), magnesium (20mg), calcium (20mg), iron (2.3mg); the values being referred to 100g of fresh product. (Apahidean, 2020).

The tomato seeds have the silver color from hairs, they are oval-rounded, and have a germination capacity of 85-90%, and can be kept for 5-6 years.

At the optimal temperature of 24°C, the germination of tomato seeds takes place in 5-7 days, and for the growth and development of the tomato root system, the optimal temperatures are between 15 - 35°C.

### MATERIAL AND METHOD

Research on the germination of some tomato varieties on a substrate made of

mineral wool and vermiculite was carried out in 2024 in Tileagd city, in Bihor county, in a vegetable microfarm.

The experience is monofactorial with 4 variants. The biological material was represented by 4 tomato varieties: Tudor F1 (V1), which is also the witness of the experiment, Paskualetto F1 (V2); Chery F1 (V3); Landolino F1 (V4), whose seeds were professional.

The Paskualetto F1 variety is a cherry tomato hybrid with indeterminate growth, balanced vegetatively-generatively, with a short distance between internodes and good vigor, recommended for all crop cycles in protected areas, with an average fruit weight of 15-18g and a diameter between 27-32 mm.

The Cherye F1 variety is a cherry tomato hybrid with indeterminate growth, with short internode spacing, recommended for all crop cycles in protected areas. It produces on average about 12 fruits/cluster, having very good taste and good uniformity. The variety also tolerates low temperatures very well.

The Landolino F1 variety is a plum cherry tomato hybrid, with indeterminate growth, with continuous binding and under stress conditions, recommended for all crop cycles in protected areas. The fruits weigh on average 30g, they are uniform, deep red in color.

On 05.03.2024, 100 seeds for each variety were sown in cylindrical plugs of

2.7x2.0cm mineral wool and vermiculite, placed in pallets with alveoli.

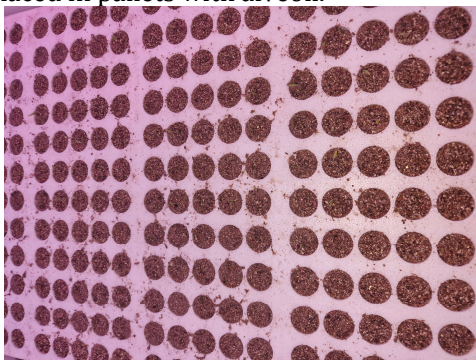


Figure 1. Pallets with alveoli

The substrate was immersed whenever needed in water with NPK 10-45-10 and microelements with an EC of 1.5, and the temperature until sunrise was maintained at 26°C.

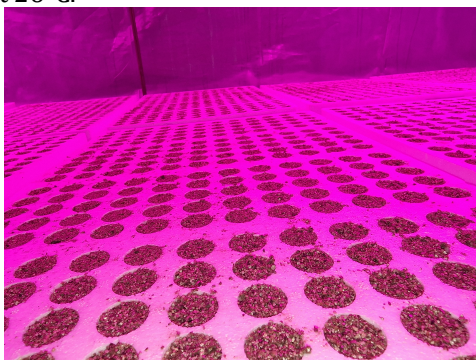


Figure 2. Growth LEDs

Growth LEDs were used, the lights were switched on on 03/07/2024 at around 15:00, and from this moment they went on continuously until 03/10/2024 when the percentage of emergence exceeded 90% for each variant.

From 10.03.2024 the bulbs were switched on from 8 am and were left on overnight only if it was cloudy, so as to ensure constant light for 14-15 hours a day, and the temperature dropped to 20° c.

On 21.03.2024, the tomatoes were transplanted into 10x10x2.7cm mineral wool cubes.



Figure 3. Mineral wool cubes



Figure 4. Transplanted tomatoes

## RESULTS AND DISCUSSIONS

To achieve the proposed objectives, the early and total germination of cherry tomatoes were analyzed for the experimental crop.

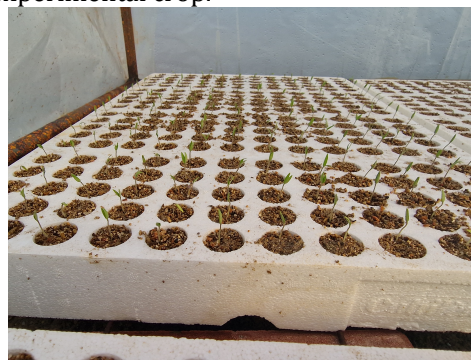


Figure 5. Germination of tomatoes

Regarding the first analyzed parameter, the data related to the early germination of cherry tomatoes obtained in the 4 varieties are presented in table 1.

Table 1

Early germination of varieties  
08.03.2024

Cr. no.	Variety	Absolute germination buc.	Relative germination %	± d kg/m <sup>2</sup>	Significance
1	Tudor F1 (Mt)	20	100	0,00	-
2	Paskualetto F1	12	60	-8	000
3	Cherye F1	69	345	+49	xxx
4	Landolino F1	23	115	+3	x

Even though the witness is an early variety, it did not excel in terms of germination earliness.

The highest early germination was recorded in the Cherye F1 variety with an increase of 345%, the difference compared to the control was ensured statistically, positively, very significant.

The Paskualetto F1 variety stood out with a poor earliness, achieving an early germination of 22.83% of the witness's germination, the difference from it was statistically assured, negative, very significant.

Table 2

**Total germination of varieties  
10.03.2024**

Cr. no.	Variety	Absolute germination buc.	Relative germination %	± d kg/m <sup>2</sup>	Significance
1	Tudor F1 (Mt)	83	100	0,00	-
2	Paskualetto F1	94	113,25	+11	xx
3	Cherye F1	96	115,66	+13	xxx
4	Landolino F1	98	118,07	+15	xxx

All varieties obtained good germination, statistically positively ensured compared to the Control.



Figure 6. Total germination of varieties

It can be seen that the seeds of Landolino F1 (118.07% of the germination of the control) and Cherye F1 (115.66% of the germination of the control) varieties germinated best, the difference compared

to the control being statistically ensured, positively, very significant.

The variety Paskualetto F1 recorded a total germination, statistically assured positive compared to the Control with 13.25%.



Figure 7. The variety Paskualetto F1

### CONCLUSIONS

To ensure the germination, growth, development and fruiting of tomatoes, it is very important to know the requirements for light, temperature, water, food, air, as well as the interaction between these factors.

Under optimal conditions of temperature, light, water and food, cherry tomatoes sown in cells with mineral wool and vermiculite started to germinate in 3 days. The studied varieties registered a total twinning over the Control, being statistically positively assured.

The Londolino F1 variety, although it did not have a very good early germination, at

the end it registered a total germination with 118.07% of the germination of the control, being statistically significantly positive.

Regarding the conditions of growth and development of the seedling until transplanting, the Paskualetto F1 variety did the best.

### REFERENCES

- Apahidean Al. S., Maria Apahideanu, 2001, Legumiculturp specială, Publishing house Academic Pres, Cluj-Napoca.
- Apahidean Al. S., Al. I. Apahideanu, 2020, Legumiculture Ed. Risoprint, Cluj-Napoca.
- Ciofu Ruxandra et al., 2004, Legumiculture, Publishing house Ceres, București.

- Dennis Dannehl, Johanna Suhl, Christian Ulrichs, Uwe Schmidt, 2015, Evaluation of substitutes for rock wool as growing substrate for hydroponic tomato production, *Journal of Applied Botany and Food Quality* 88, 68 - 77 (2015), DOI:10.5073/JABFQ.2015.088.010
- Dută Adriana, Rodica Soare, 2006, Elemente de practică legumicolă. Tipo.Universității Craiova
- Fauzia Mahanaz Shorobi, Govind Dnyandey Vyavahare, Yeong Ju Seok, Jin Hee Park, 2023, Effect of polypropylene microplastics on seed germination and nutrient uptake of tomato and cherry tomato plants, *Chemosphere* Volume 329, July 2023, 138679
- Indrea D. Al. S. Apahidean, 2012, Ghidul cultivatorului de legume Ediția a IIa, Ed. Ceres, București.
- Kulyash Meiramkulova, Zhanar Tanybayeva, Assel Kydyrbekova, Arysgul Turbekova, Serik Ayt Khozhin, Serik Zhantasov and Aman Taukenov, The Efficiency of LED Irradiation for Cultivating High-Quality Tomato Seedlings, *Sustainability* 2021, 13, 9426
- Metin Turan, Ertan Yildirim, Melek Ekinci and Sanem Argin, 2021, Effect of Biostimulants on Yield and Quality of Cherry Tomatoes Grown in Fertile and Stressed Soils, *HortScience* Volume 56, Issue 4, ISSN 2327-9834
- Popescu V., Horgoș A., 2003, Legumiculture. Publishing house Ceres, București
- Rusu Teodor, Experimental technique, 2020, Ed. Risoprint Cluj-Napoca ISBN 978-973-53-2496-4.
- Stan T. N., Stan N. T., 1999, Legumiculture, Vol.I., Publishing house Ion Ionescu de la Brad, Iași.