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COMPARATIVE STUDY OF THE SUBSTRATE INFLUENCE ON THE GERMINATION AND DEVELOPMENT OF RILA TOMATO SEEDLINGS

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Abstract
It is known that vegetables are some of the valuable foods in the diet because of their content in nutrients, vitamins and minerals. Many species used in human food are grown by producing seedlings (Solanaceae, Brassicaceae, etc.). In order to achieve a good tomato culture, we must first take into account the quality of the seedlings. In this work we used seed of the same quality, that was sown for germination on 4 types of substrate (Gramoflor peat, Jiffy peat, Kllasman TS3 peat and Milaflor peat) to see how influence the germination and the growth of Rila tomato seedlings. Throughout the research it has been observed that the substrate influences the dynamics of plant height growth, the number of leaves per plant, roots length, root volume, aerial plant part volume, total weight, root weight, aerial plant part weight. The Gramoflor substrate had the best results in all measurements reaching the highest value, except for the length of the root system at the time of planting and the root system volume at the time of planting.

Keywords: Rila tomato, seedlings, substrate

1. INTRODUCTION

High quality seedlings are an important factor in production, both qualitatively and quantitatively. It is well known that in vegetable growing, in protected and unprotected crop systems, the producers that appear first on the market impose the price of capitalizing on production with favorable financial results (Dobrin, 2005).

This work highlighted the influence of different types of substrate on the growth and development of tomato seedlings that have been transplanted and maintained in this substrate until planting.

This species was chosen because of the importance it represents in the cultures and food of the Romanian population. Among vegetable species, tomatoes occupy the largest crop area in the country and due to the staggering of production throughout the year through their cultivation in the field as well as in protected areas.

The nutrient substrate plays a very important role in obtaining quality seedlings. It is very important for the substrates to meet the following characteristics: be lean, permeable,

with a high water retention capacity, rich in nutrients, have a pH corresponding to the species to which it is used, uninfected by weeds, or with germs and pests.

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A quality substrate is obtained by mixing several components (peat, broom, celery or garden soil, sand, composts). Lately, forestry compost is often used as a result of chopped and fermented tree shells with nitrogen fertilizers. Very good results have been obtained in our country through the use of composting of pigs, residues from water treatment plants and household waste (Vâjâială et al., 1983, 1984, 1987).

The manure is undoubtedly the best natural fertilizer, and when it comes to seedlings, it can not be missed from the production process. This is essential for the vigorous development of the plums and is very easy to achieve. It is obtained from manure by fermentation, having a soil aspect, representing 25% of the original manure weight.

The manure contains on average 0.7-2% N total, 0.3-1.2% P_2O_5, 0.8-0.9% K_2O, 0.5% CaO, at a content of 55-70% water (Davidescu and Davidescu 1992).

Peat is an organic material that forms under natural conditions, an organic component of exceptional technological quality, deriving from the decomposition of large quantities of peat moss deposits in the peat. It has a great advantage over it, that it can be used immediately after its fermentation and decomposition. There are over 400 million hectares of global peatland in all countries except cold areas (Bather and Miller, 1991).

The recipe of the mixture is determined depending on the species to be used, the purpose used, the sowing or the repow, as well as the possibilities of purchasing each element (Ciofu et al., 2003).

The calculation of the required seed quantity depends on the number of seedlings to be produced and the cultural value of the material, and the sowing area is determined by knowing that generally 1 ha of culture should be sown 40-60 m^2 if the seedlings are transplanted and 120-200 m^2 if it seldom resembles and does not transplanted (Popescu, 2003).

The temperature varies according to the species and the vegetation phase, constantly correlating to the intensity of light, and the nutrition regime should be managed with great care (Florescu, 1992).

At the time of planting, the seedling should have a height of 15-20 cm, 6-8 leaves, 6-8 mm in diameter, the age of 90 days and the dark green color (Popescu and Hoza, 2000).

2. MATERIALS AND METHODS

As a biological material, we used Rila tomato seeds. Rila tomatoes are an easy-to-use culture for beginners as well as for experienced people. It is a fruitful variety, producing in a single season 100-120 t / ha. Due to the undetermined growth, it offers the possibility of a staggered harvest. It is characterized by its storage and transport resistance.

We have made 4 experimental variants (figure 1) in 3 repetitions of 10 plants, totaling 120 plants. The experimental variants refer to the type of substrate in which the tomato seedlings were sown:

V1 - Gramoflor consists of: 60% peat (degree of decomposition H3-H8), vegetable products from forestry (wood fiber), perlite, mineral fertilizers NPK and secondary components: nitrogen (210 mg / L P_2O_2), potassium (370 mg / l K_2O). It has a pH of 5.8 with a salt content of 1.4 g / l, humectant of 11 / m^3 and an organic matter content of 85-95%.

The nutritional value of the product helps to flourish and provides plant fortification, with good water drainage; is a very easy to wet substrate. As an advantage, it creates ideal conditions for seed harvesting and growth of young plants, is intended for harvesting young plants. It has a special structure, being also used for the grafting of young plants, it is also used for the re-cultivation of the flower culture and for the vegetative propagation of the vegetables.

V2 - Jiffi -Fertilized peat substrate for sowing and growing seedlings for a specified period in small trays and pots. The peat substrate is selected, free from weeds, pests, pests and impurities, and in

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terms of structure it is uniform. It has a pH of 5.8. This fertilizer provides a sufficient level of nutrients for 3 to 6 weeks. Additional fertilizers should be added after this period. This substrate originates in the Netherlands.

V3 - Klassman TS3 has a pH of 5.5-6.5, its structure includes 20% black peat, 80% blossom peat and microelements.

V4 - Milaflor represents an optimal environment for the development of all plants. It has a high energy of gas and water absorption. It has a 0-7 mm granulation, an extraphin structure, having a pH of 5.5-6.5. As a composition, this type of peat consists of: blonde peat, microelements and humidifying agent. It is used for vegetable and flower seedlings in alveoli. It has a high absorption capacity and increased water storage. It is granulated having a very good drainage of the water, being an easy to wet substrate.

The sowing was performed on 12 February 2018 in alveolar pallets filled with the 4 types of peat-based professional nutrient substrate at a depth of 1 cm and the temperature of the substrate being 18 ° C and the air of 24 °C.

After sowing, the seeds were coated with a peat-based thin layer, then a slight leveling was performed. Subsequently, the seed was wetted with lukewarm water with a fine sieve sprinkler.

The maintenance work on seedlings took place immediately after sowing and lasted until planting of seedlings at last. In order to guide the vegetation factors, it was taken into account that they are closely connected to each other, the maximum efficiency of one of them is achieved when the others are assured.

The percentage of 100% emerged tomatoes was reached 18 days after sowing due to the cold of this period. Tomatoes originated entirely on 3 March 2018.

Figure 1. Plantlets emerging in the 4 types of substrate

The diseases and pests combating was achieved by applying preventive treatments with Previcur 0.15% 3 l / m^2 and Dithane M-45 0.15%, alternately applied to 7-10 days to avoid the occurrence of seed-bearing diseases, such as the fall of placentas Phytium debarianum). Treatments with Actara 25 WG insecticide 0.15 kg / ha have been applied, which act on a wide range of insects: *Aphidae* spp., Colorado-*Leptinotarsa decemlineata* beetle, *Trialeurodes vaporariorum* white mussel. Prior to planting, a 0.5% bordelene broth treatment was performed.

Keeping weeds clean is done repeatedly, whenever necessary. This was when the weeds were small, after a preliminary watering so that they could be snapped out without disturbing the seedlings.

Prior to planting for 10-12 days, the process of quenching the seedlings first started by opening windows one at a time (3-4 times a day), eventually allowing them to be left permanently open, and by reducing humidity.

In this experience the following observations and determinations were made: the dynamics of plant growth in height; the number of leaves per plant; plant height; root length; the volume of the roots; airspace volume; total weight; root mass; the mass of the airspace; package diameter**.**

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3. RESULTS AND DISCUSSIONS

We determined the ***growth dynamics*** of plants (figure 2) by measuring 14 to 14 days from March 13 until May 8 when seedlings were planted in the solar.

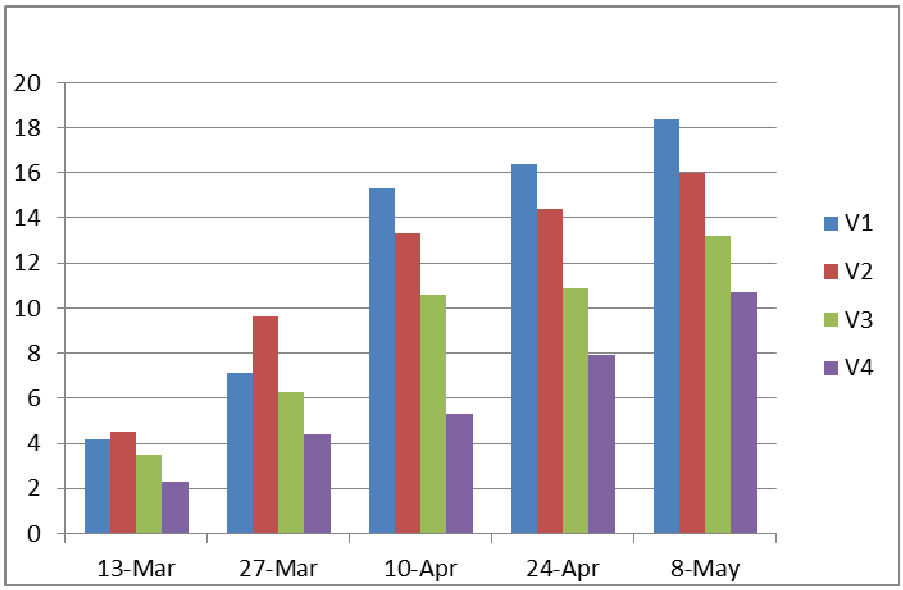

Figure 2. Plant height (cm)

Growth of seedlings is influenced by the type of substrate in which they were sown. Initially V2 (Jiffi) recorded the highest value after which it dropped against V1. On May 8, the highest value was recorded at V1 (Gramoflor), and the smallest value was recorded at V4 (Milaflor).
Data on the number of leaves per plant are shown in Figure 3.

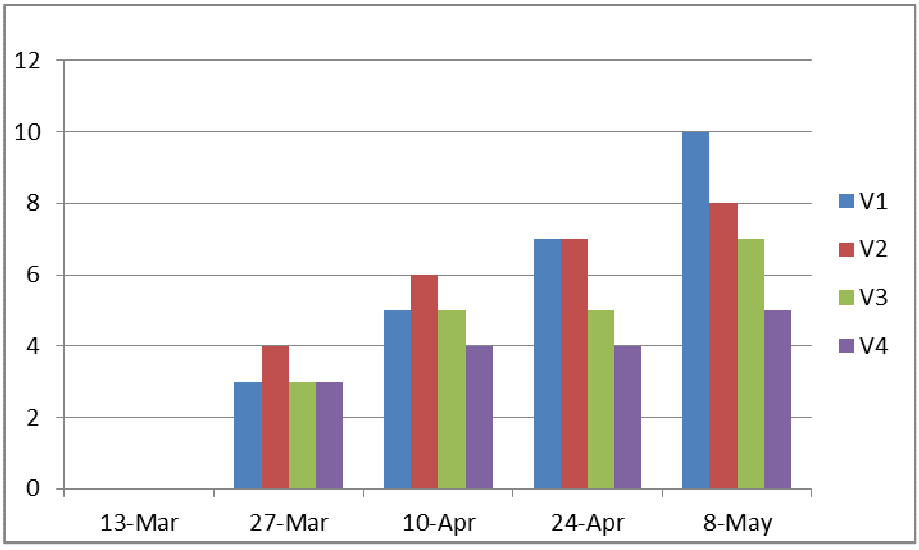

Figure 3. Number of leaves per plant

The low temperature during this period led to the delay of the appearance of true leaves. They appeared on 27 March, on May 8 reaching a maximum of 10 leaves at V1.

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All the variants studied determined the number of leaves per plant to be close to that mentioned in the literature (6-8).
A maximum value is observed for the number of leaves per plant at variance V1, and the minimum value is recorded at V4 (Milaflor).
Prior to planting the seedlings at the final site, a series of determinations were performed which were analyzed below.

Figure 4. The seedlings aspect before planting

Regarding seedlings height (figure 5), at the time of planting variant V1 shows the highest value (27 cm), and variant V4 records the lowest value (12 cm).

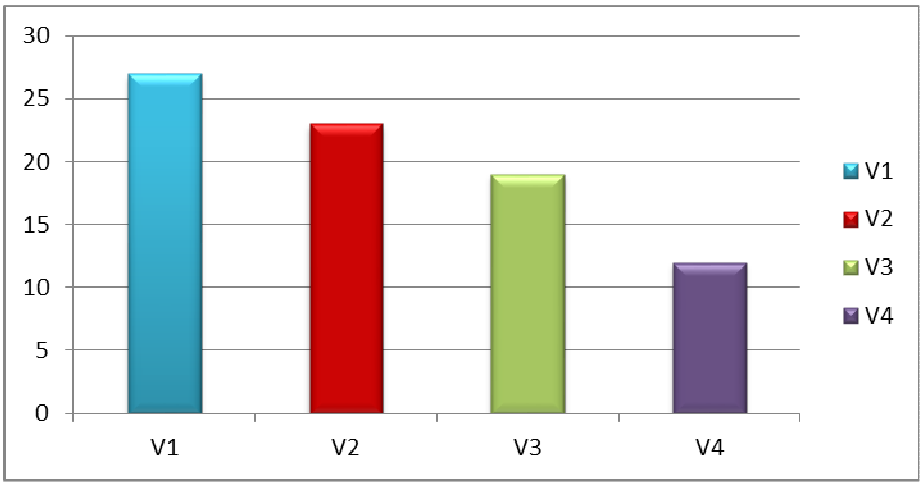

Figure 5. Plant height at planting (cm)

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As far as the root length is concerned, at the time of planting V3 (Rila in substrate Klassman TS 3) has the highest value (25 cm) and V4 is the lowest value (11 cm).
We note that KlassmannTS 3 peat positively influences the development of the root system.
Regarding the volume of the foliar appliance (figure 6), at the moment of planting, variant V1 shows the highest value, and variant V4 records the lowest value. It is noted that Gramoflor peat influences positively the foliar appliance, whereas Milaflor peat influences negatively, having a very low value compared to the other variants.

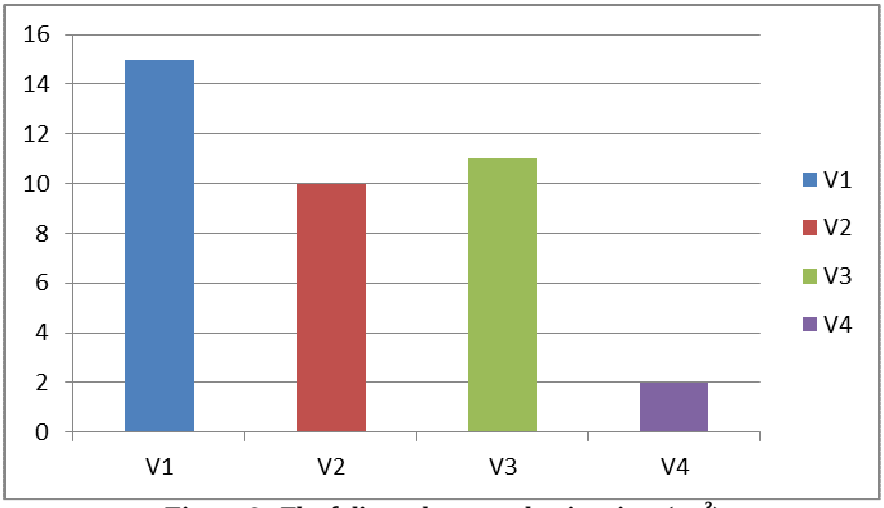

Figure 6. The foliar volume at planting time (cm^3)

Regarding **the volume of the root system at the time of planting** (figure 7), the highest value was recorded at V2, and the lowest value was recorded at V4.
The other variants had equal values, not very small compared to V2.

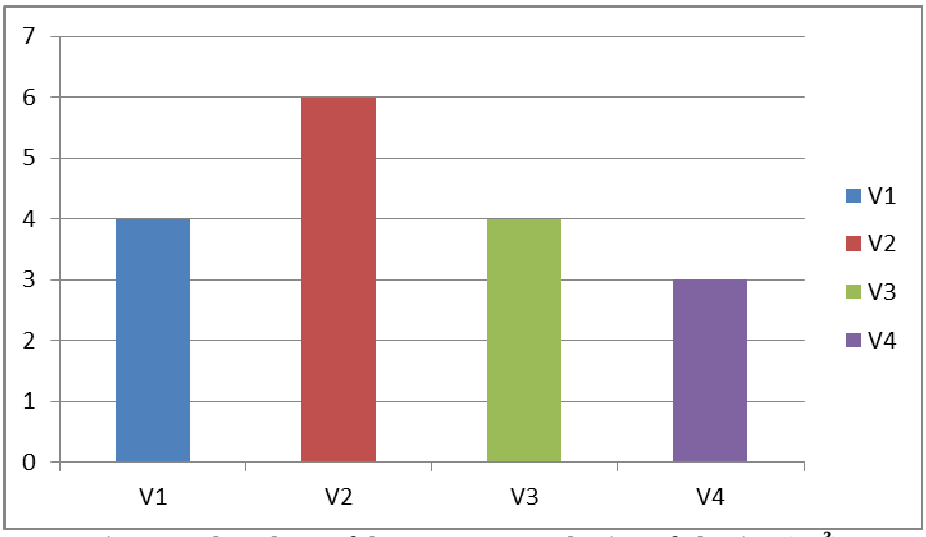

Figure 7. The volume of the root system at the time of planting (cm^3)

Analyzing the character of the total mass of the seedlings (figure 8) it is observed that the highest values were recorded in variant V1 and the lowest values in variant V4.

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The Gramoflor substrate has positively influenced the total seedlings, at the time of planting reaching 22.05g compared to Milaflor, which reached 3.2g.

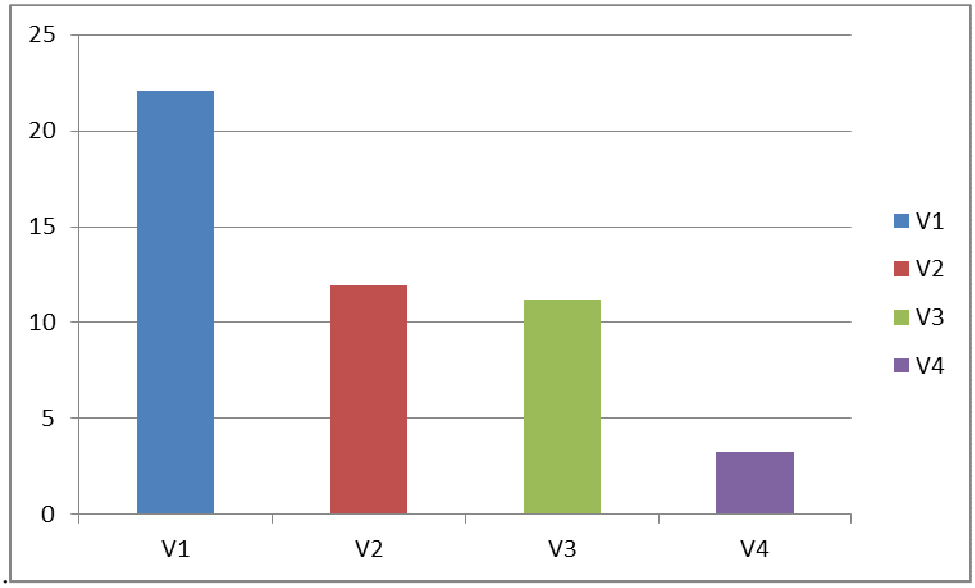

Figure 8. The total mass of seedlings at the time of planting (g)

The mass of the foliar apparatus (Figure 9) revealed Gramoflor substrate V1 where it recorded the highest value of 17.72 g, compared to Milaflor which reached the lowest value of 2.43g resulting in the latter having a negative influence on the foliar plant of seedlings.

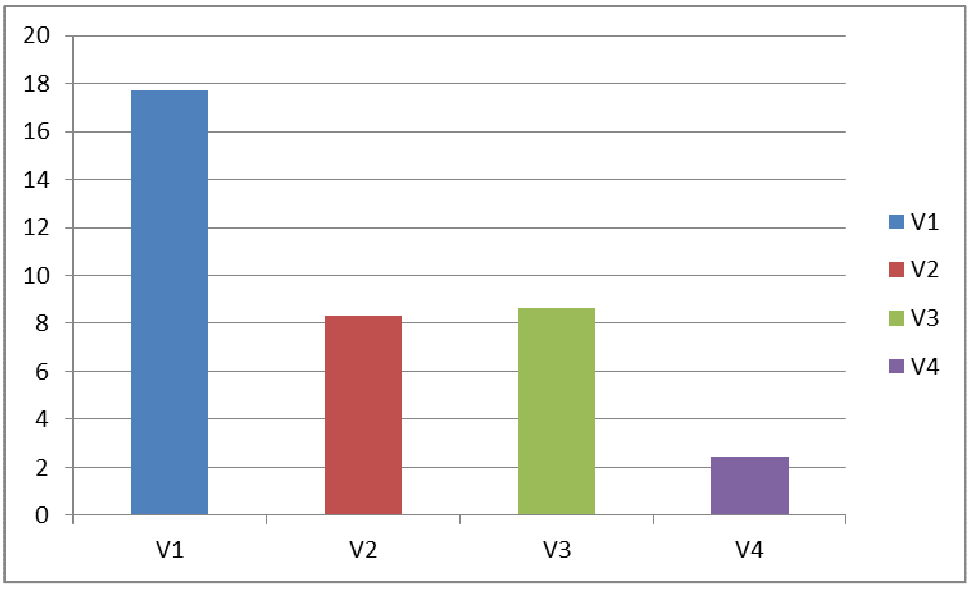

Figure 9 The mass of the foliar appliance at the time of planting (g)

Regarding the mass of the root system (figure 10), the highest value was recorded at V1, and the lowest value was given to the seedlings sown in the Milaflor peat substrate.

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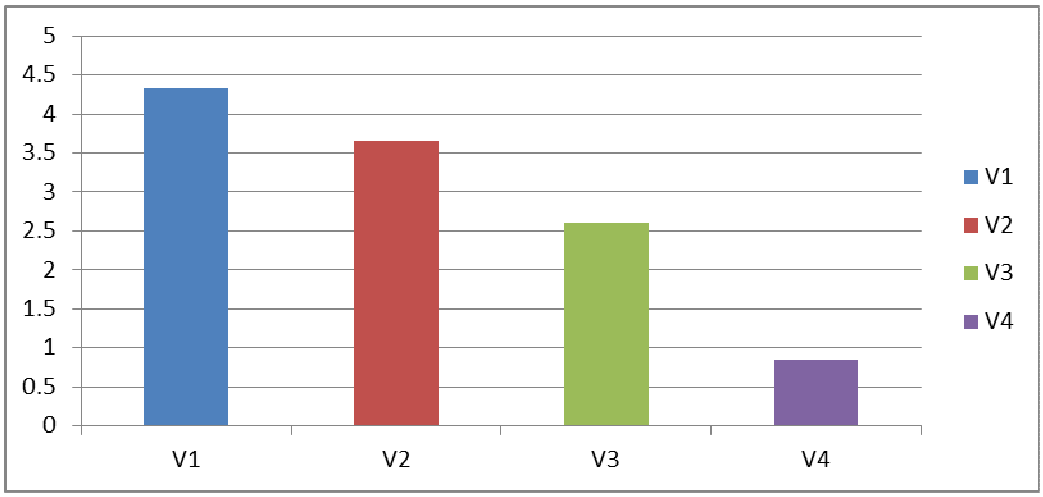

Figure 10. The mass of roots at planting time (g)

As regards the diameter of the package (Figure 11), the highest value was also recorded at V1 and decreasing orderly in the other variants, reaching a minimum for V4 variant.

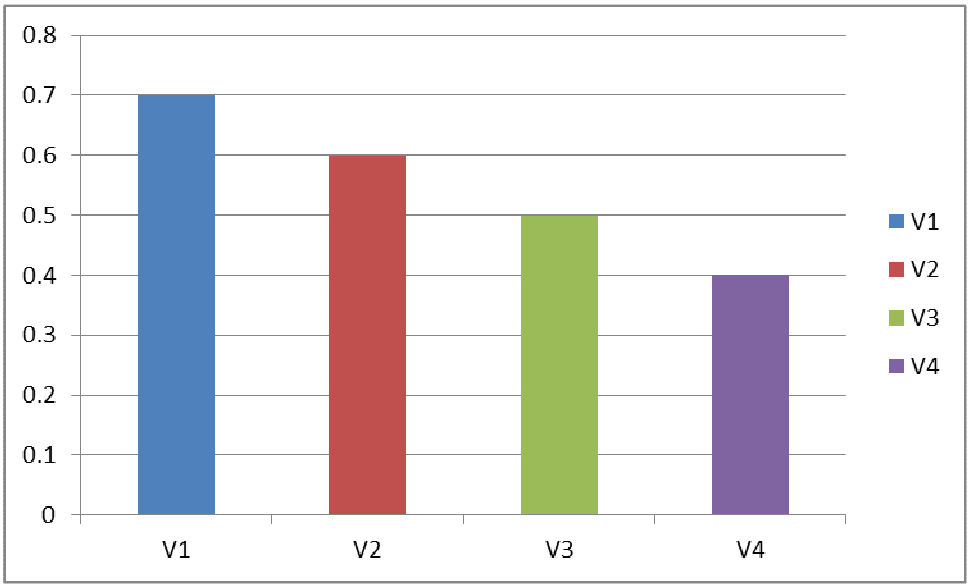

Figure 11. Diameter of package at planting (cm)

4. CONCLUSIONS

The vegetative plant growths were influenced by the substrate in which they were sown.
On May 8, the smallest plant height was recorded at V4, and the highest value at V1, even at the beginning of V2, recorded the highest values.
The Rila hybrid sown on Gramoflor substrate presented the highest values of the characters: the number of leaves / plant, the volume of the foliar appliance, the mass of the root system, the mass of the foliar apparatus, but also the total mass.
At the time of planting V3 shows the highest value for roots length, and V4 shows the lowest value.
The root volume had the best result on sowing seedlings on the Jiffi substrate, V2.

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The Gramoflor substrate had the best results in all measurements reaching the highest value, except for the length of the root system at the time of planting and the root system volume at the time of planting.
The first three variants studied have determined the development of quality seedlings with good growth and very attractive appearance.
The Milaflor substrate has negatively influenced the growth and development of seedlings, with the lowest values for all the studied characters, demonstrating that it should be avoided in the use of tomato seedlings.
Following the study, it is highly recommended to use the Gramoflor, Jiffi and Kalssman TS3 substrates to produce tomato seedlings.

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