VEGETATIVE MULTIPLICATION OPPORTUNITIES IN SEVERAL SPECIES OF PELARGONIUM IN A PRIVATE AREA FROM GIARMATA, TIMIS COUNTY, ROMANIA

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Abstract. *In the paper, we present vegetative propagation opportunities by cuttings in five species of Pelargonium in a private area in Giarmata, Timiş County, Romania. We monitored four species of Pelargonium rooting in various culture substrates, and as a control variant, we used sand. Research took place over a period of two years, 2019 and 2020. The rooting of the cuttings was made in the first half of July of each year, and the verification of the rooting was made in the second half of August. The plants were laid in boxes and left to hung in warm greenhouses and, in March, the rooted cuts were planted in a mixture of barbel and sand, in pots having a diameter of 10 cm. From each species, we took 20 pots and monitored the number of rooted cuttings from each species and substrate, we calculated the average and the relative value and the difference to the control. Data were processed by statistically calculus using variance analysis. Following the results, for production, we recommend the multiplication by cuttings of the zonal Pelargonium species, having as main stage attaching the cuttings in the perlite and sand + perlite substrates, in which the percentage of rooting compared to the control sand was the highest. For Pelargonium grandiflorum, we recommend multiplication by cuttings in peat and pearl + peat substrates, where higher rooting over the control was recorded. For Pelargonium peltatum, we recommend multiplication through cuttings in the peat substrate. In the species Pelargonium odoratissimum, we recommend multiplication with cuttings planted in the sand substrate, where the best results for Pelargonium production were obtained.*

Keywords*: Pelargonium, cuttings, vegetative multiplication, substrate, rooting*

INTRODUCTION

Pelargonium is one of the most well-known, widespread and beloved flowers due to its beauty, variety and resistance, having a great power of survival in difficult (arid) conditions.(This plant adapts quickly, both indoors and outdoors in the spring-autumn period. (L. NIȚĂ, ET. COLAB., 2012; NIȚĂ S., NIȚĂ L., PANAITESCU L., 2015; OKROS ADALBERT, 2015; OKROS ADALBERT, ET COLAB., 2019; SAIDA FEIER DAVID, NICOLETA MATEOC –SÎRB, TEODOR MATEOC, CRISTINA BACĂU, ANIȘOARA DUMA COPCEA, CASIANA MIHUȚ, 2020). It is cultivated for the decoration of interiors, windows, terraces, and gardens. (MIHUȚ CASIANA, RADULOV ISIDORA, 2012; MIHUȚ CASIANA, OKRÖS A., IORDĂNESCU OLIMPIA, 2012; V.D.MIRCOV, C. MOISE, CODRUTA CHIS, 2015).

Due to the beautiful foliage, the continuous and sustained flowering, it is a popular flower, much loved and widespread. (ANTON DOINA, 1992, Floricultură specială, Editura Reprografia, Universitatea din Craiova; BĂLA MARIA, 2003; BĂLA MARIA, 2007; CANTOR MARIA, IOANA POP, 2005; CANTOR MARIA, IOANA POP, 2008)

The geranium is part of the genus Pelargonium and includes over 300 species and varieties of perennials. Most species are native to South Africa, Australia and New Zealand. But there are also varieties that grow freely in Madagascar, Yemen, East Africa and Asia Minor. They have a height between 30 and 100 cm, have flowers and leaves of different shapes, colors (more intense or less colored) and sizes. Some of them can be scented, with a scent of mint, pine, cinnamon, lemon, pineapple, orange, etc. However, most varieties are not

resistant to frost, with the exception of the Himalayan Geranium species. (NICU CARMEN, ANTON DOINA, MANDA MANUELA, 2007; ŞUMALAN RADU, 2009; TOMA FLORIN, 2009).

The first variety of geranium grown in Europe is Pelargonium triste, brought from South Africa around 1600, when European vessels were stationed at the Cape of Good Hope.

MATERIAL AND METHODS

For this study we followed 4 species of Pelargonium, rooting in different substrates, consisting of sand, perlite, peat or mixtures thereof.

20 plants of each species were used, in three repetitions, and for the interpretation of the data the analysis of variance was used.

As a control, I used a sand substrate.

The cuttings were rooted in the first half of July 2019 and 2020, between 15-20.07.2019 and 2020 and the catch was checked in the second half of August.

The plants were allowed to overwinter in greenhouse conditions, in boxes.

During March, the Pelargoniums were planted in a meadow mixed with sand, in pots with a diameter of 10 cm.

After payment in pots, 20 pots of plants of each species were taken to the studio, after which we counted the number of cuttings rooted in different substrates, in three repetitions, then averaging them.

Data processing was performed by statistical calculation using analysis of variance, calculation of the number of cuttings rooted in the substrates used:

We used 5 different variants as a substrate:

V0 - Witness - Sand

V1 - Perlite;

V2 - Peat;

V3 - Sand + Perlite

V4 - Sand + Peat;

V5 - Perlite + Peat.

Pelargonium rooting was done using five variants, plus the sand variant that we used as a Control variant, in three repetitions, averaging them and calculating the relative value and difference from the control.

RESULTS AND DISCUSSIONS

The results regarding the propagation by cuttings to Pelargonium were made over a period of two years, 2019 and 2020, these being presented in tables 1 and 2.

Table 1.

Rooting of cuttings to zonal Pelargonium in 2019

Substrate used	R1	R2	R3	Averange	Relative value	Difference from control	Semnificance
Witness - Sand	15	16	15	17.67	100	0.00	Witness
Perlite	18	19	18	18.00	101.89	0.33	-
Peat	12	11	11	17.00	96.23	-0.67	-
Sand + Perlite	17	19	18	17.67	100.00	0.00	-
Sand + Peat	18	19	18	18.33	103.77	0.67	-
Perlite + Round	19	18	19	18.33	103.77	0.67	-

DL5% = 1.371 DL1% = 1.948 DL0.1% = 2.821

From the data presented in the table above, it is observed that in 2019 there were no meanings compared to the control in any variant regardless of the substrate used.

Table 2.

Rooting of cuttings to zonal Pelargonium in 2020

Substrate used	R1	R2	R3	Averange	Relative value	Difference from control	Semnificance
Witness - Sand	15	16	14	15.00	100.00	0.00	Witness
Perlite	18	19	17	18.00	120.00	3.00	* *
Peat	13	11	11	11.67	77.78	-3.33	* * *
Sand + Perlite	17	19	18	18.00	120.00	-3.00	* *
Sand + Peat	18	19	18	18.33	122.22	3.33	* * *
Perlite + Round	19	18	19	18.67	124.44	3.67	* * *

DL5% = 1.617 DL1% = 2.299 DL0,1% = 3.329

The rooting of the regional Pelargonium cuttings in 2020 compared to the Control showed very significant positive values for the variants we used as substrate Peat, Sand + Peat and Perlite + Peat, while in the variants with Perlite and Sand + Perlite values were recorded distinctly significant to the witness.

In tables 3. and 4. we presented the values obtained by rooting the cuttings to Pelargonium grandiflorum in 2019 and 2020, respectively.

Table 3.

Rooting of cuttings in Pelargonium grandiflorum in 2019

Substrate used	R1	R2	R3	Averange	Relative value	Difference from control	Semnificance
Witness - Sand	17	18	17	17.33	100.00	0.00	Witness
Perlite	19	19	18	18.67	107.69	1.33	*
Peat	16	15	16	15.67	90.38	-1.67	*
Sand + Perlite	18	19	19	18.67	107.69	1.33	*
Sand + Peat	19	18	19	18.67	107.69	1.33	*
Perlite + Round	19	19	19	19.00	109.62	1.67	*

DL5% = 1.051 DL1% = 1.494 DL0.1% = 2.164

In 2019, when the cuttings were rooted in Pelargonium grandiflorum, compared to the control variant, semi-positive values were registered for the variants used: Perlite; Sand + Perlite; Sand + Peat, while in the case of variants: Peat and Perlite + Peat, distinctly significant values were recorded.

Table 4.

Rooting of cuttings of Pelargonium grandiflorum in 2020

Substrate used	R1	R2	R3	Averange	Relative value	Difference from control	Semnificance
Witness - Sand	17	18	16	17.00	100.00	0.00	Witness
Perlite	19	18	18	18.33	107.84	1.33	*
Peat	16	16	15	15.67	92.16	-1.33	*
Sand + Perlite	18	18	19	18.33	107.84	1.33	*
Sand + Peat	19	18	18	18.33	107.84	1.33	*
Perlite + Round	19	17	19	18.33	107.84	1.33	*

DL5% = 1.051 DL1% = 1.494 DL0.1% = 2.164

In 2020, when rooting the cuttings to Pelargonium grandiflorum, compared to the control variant, semi-positive values were registered in all five variants regardless of the substrate used.

Tables 5 and 6 present the situation regarding the rooting of cuttings for Pelargonium peltatum in 2020 and 2021.

Table 5.

Rooting of cuttings in Pelargonium peltatum in 2019

Substrate used	R1	R2	R3	Averange	Relative value	Difference from control	Semnificance
Witness - Sand	17	18	17	17.33	100.00	0.00	Witness
Perlite	18	17	16	17.00	98.08	-0.35	*
Peat	14	15	14	14.33	82.69	-3.00	* * *
Sand + Perlite	17	18	18	17.67	101.92	0.33	*
Sand + Peat	18	18	17	17.67	101.92	0.33	*
Perlite + Round	18	17	16	17.00	98.08	-0.33	*

DL5% = 1.371 DL1% = 1.948 DL0.1% = 2.821

In 2020, when the cuttings of Pelargonium peltatum were rooted, compared to the control variant, the Peat substrate had significant values and in those of Perlite; Sand + Perlite; Sand + Peat and Perlite + Peat had insignificant values.

Table 6.

Rooting of cuttings in Pelargonium peltatum in 2020

Substrate used	R1	R2	R3	Averange	Relative value	Difference from control	Semnificance
Witness - Sand	17	17	17	17.00	100.00	0.00	Witness
Perlite	17	16	17	16.67	98.04	-0.35	*
Peat	17	17	18	17.33	101.96	0.33	*
Sand + Perlite	18	17	18	17.67	103.92	0.67	*
Sand + Peat	18	16	16	16.67	98.04	-0.33	*
Perlite + Round	18	16	17	17.00	100.00	0.00	*

DL5% = 1.086 DL1% = 1.543 DL0.1% = 2.235

In 2020, when rooting the cuttings to Pelargonium peltatum, compared to the control variant, no significant values were registered.

Table 7.

Rooting of cuttings in Pelargonium odoratissimum in 2019

Substrate used	R1	R2	R3	Averange	Relative value	Difference from control	Semnificance
Witness - Sand	18	17	18	17.67	100.00	0.00	Witness
Perlite	18	19	17	18.00	101.89	0.33	*
Peat	16	17	18	17.00	96.23	-0.67	*
Sand + Perlite	18	17	18	17.67	100.00	0.00	*
Sand + Peat	18	18	19	18.33	103.77	0.67	*
Perlite + Round	18	18	19	18.33	103.77	0.67	*

DL5% = 1.371 DL1% = 1.948

In 2019, when rooting the cuttings of Pelargonium odoratissimum, compared to the control variant, no significations were registered.

Table 8.

Rooting of cuttings in Pelargonium odoratissimum in 2020

Substrate used	R1	R2	R3	Averange	Relative value	Difference from control	Semnificance
Witness - Sand	17	19	18	18.00	100.00	0.00	Witness
Perlite	18	19	17	18.00	100.00	0.00	*
Peat	19	18	19	18.67	103.70	0.67	*
Sand + Perlite	17	16	18	17.00	94.44	-1.00	*
Sand + Peat	18	16	19	17.67	98.15	-0.33	*
Perlite + Round	18	17	19	18.00	100.00	-0.33	*

DL5% = 2.040 DL1% = 2.900 DL0.1% = 4.199

When the cuttings were rooted in Pelargonium odoratissimum and in 2020, as in 2019, there were no significant changes compared to the control variant.

CONCLUSIONS

In the case of P. zonale, in the two years of research (2019 and 2020), the statistical calculation of the data on rooting of cuttings highlighted the fact that at the rooting of cuttings, in 2019 compared to the Control, no significance was registered and in year 2020, the values obtained were significantly positive in the variants in which substrate of: Peat was used; Sand + Peat and Perlite + Peat, while in the variants where Perlit and Sand + Perlite were used, they had distinctly significant values compared to the Control variant.

In the species P. grandiforum, regarding the rooting of cuttings in 2019 compared to the control, very significant positive values were registered in the Peat substrate and in the substrates Perlite, Sand + Perlite, Sand + Peat, Perlite + Peat, the values recorded were insignificant. In 2020, no meanings were recorded.

In the species P. odoratissimum, in the two years of research, no meanings were registered compared to the control variant.

For production, I recommend the propagation by cuttings of the P. zonal species, having as main stage the catching of the cuttings in the substrate Perlite and Sand + Perlite, in which the percentage of catching compared to the control Sand was the highest.

In the case of P. grandiflorum, I recommend propagation by cuttings in Peat and Perlite + Peat substrates, where there was a higher percentage of attachment than the control.

Especially for P. peltatum, I recommend propagation by cuttings in the peat substrate.

For the species P. odoratissimum, I recommend propagation by cuttings in the Sand substrate, where the best results for the production of Pelargonium were obtained.

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