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EFFECTS OF GROWING MEDIUM TYPE ON GROWTH AND FLOWERING OF SAINTPAULIA (*SAINTPAULIA IONANTHA WENDI*)

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ABSTRACT

Saintpaulia is one of the most popular flowering houseplants that need a proper growing medium for optimal vegetative and reproductive growth. It has been proved that the application of supplementary fertilizers, appropriate growing medium, and artificial light could provide more favorable growth and flowering conditions for most plants. For this purpose, a separate experiment was performed to investigate the factors affecting the growth and flowering in this plant. The first experiment investigates three growing media (peat, cocopeat: perlite and peat moss: perlite). All experiments were performed as a factorial experiment in a completely randomized factorial design with five replications. Most of the measured traits were significantly affected by the treatments of these three experiments. The use of peat moss: perlite growing medium with equal ratio along with the application of phosphate fertilizer provided the best yield.

1. INTRODUCTION

Saintpaulia is a modern ornamental product and has high economic importance. This plant has a rosette growth habit with fluffy and egg-shaped leaves. The flowers in this plant are formed on five round petals on short stems. The petals have no trichomes on the surface but have trichomes at the back surface and on the edges. The color of the flowers is usually blue, pink, purple, blue-purple, colorless or almost white. The flowers have two stamens with large, kidney-shaped and yellow flowers. The ovary is short, conical and a long style with egg-shaped fruit. This plant is a day-neutral plant and its flowering is controlled by the temperature and intensity of the light (Dole, 1999). The characteristics that have made this plant to be a popular houseplant is resistance to shaded locations, flowering ability under artificial light, considerable ease of vegetative propagation in throughout of year and its visual attraction (Sunpui and Kanchanapom, 2002).

1.1 COMMON NAMES OF SAINTPAULIA

The common name of Saintpaulia is African violet and its scientific name is Saintpaulia ionantha Wendi (Dole and Wilkinz, 2006)

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1.2 SAINTPAULIA FAMILY AND CLASSIFICATION

This plant belongs to the Gesneriaceae family. There are approximately 125 genera and more than 2000 species in this family (Larson, 1992). This family includes many popular houseplants. Other plants of this family that are commercially cultivated include Achimenes, Sinningia, Streptocarpus (Dole and Wilkinz, 2006).

1.3 DIFFERENT METHODS OF PLANTING AND REPRODUCING SAINTPAULIA

The use of seed as a reproducing method is applied only for breeders. At the commercial level, leaf cuttings are used. The best cuttings are taken from mature leaves of two-month-old plants. The length of the petiole should be 4 to 5 cm and does not root-generating hormones. Nowadays, tissue cultivation methods are used for quick increasing of new cultivars or to generate **chimeras** when leaf cuttings are not able to preserve their chimeras (Dole and Wilkinz, 2006).

1.4 USE OF A NUMBER OF NON-SOIL GROWING MEDIA IN A NUMBER OF EXPERIMENTS

In order to evaluate the effect of growing medium on growth and flowering of Saintpaulia, four growing media were used by Salahshoor (2014): sandy loam soil, cocopeat, cocopeat + perlite (1: 1), vermicompost + pine bark (3 : 1), vermicompost + sand + perlite (3: 2: 1). In this experiment, all the plants cultivated in the sandy loam soil medium were destroyed due to lack of sufficient space to grow roots and limited aeration to Saintpaulia roots. The shoot highest fresh and dry weight, root fresh and dry weight, number of leaves, leaf area, plant diameter, and flower diameter was related to cocopeat: perlite medium. The highest number of flowering branches, number of flowers, number of buds, the longevity of flowers was observed in two cocopeat: perlite and vermicompost + sand + perlite media, which did not show any significant difference with each other. Conducting studies on different growing media for the cultivation of houseplants seems to be essential. Using organic waste and various minerals, low-cost indigenous growing media can be introduced as cheaper, available, and high-quality alternatives for imported growing media. For this purpose, Ismaili et al (2013) conducted a study to investigate the different organic and inorganic growing media were on pot plants and ornamental leaves of Dracaena marginata Ait. The growing media used included different ratios of peat, urban waste compost, and vermicompost in combination with perlite and zeolite. The results showed that medium containing 50% peat + 50% perlite, 50% urban waste compost + 50% perlite and 50% vermicompost + 25% perlite and 25% zeolite had the highest effect on plant height, leaf number and stem diameter. To examine the effect of different growing media on the growth and yield of Gerbera aurantiaca, Khalaj and Amiri (2011) conducted an experiment. The treatments included: sand, peat + sand (25% + 75%) and peat + sand (50% + 50%) and perlite + peat (75% + 25%) and perlite + peat (50% + 50%) and perlite + peat (75% + 25%) and perlite+ peat+ clay aggregate (50% + 25% + 25%) and perlite+ peat + clay aggregate (25% + 50% + 25%) and peat + clay aggregate (50% + 50%) and pure cocopeat and cocopeat+perlite (75% + 25%) and cocopeat + perlite (50% + 50%) and cocopeat + perlite + clay aggregate (50% + 25% + 25%).

The results showed that the use of perlite + peat + clay aggregate (25% + 70% + 5%) had a significant difference in the number of flowers, stem diameter, flower height, and flower longevity after its harvest compared to other growing media. In this medium, the number of flowers, the diameter of disk flower, stem neck diameter, flower height, and flower longevity after its harvest were 207 numbers per m 2 / year, 12.4 cm, 0.8 cm, 0.58 cm, 54.5 cm and 11.6 days, respectively. Given the qualitative and quantitative characteristics of Gerbera flower, among the different growing media used in this study, the mixture of perlite + peat + clay aggregate (25% + 70% + 5%) was the most suitable medium and could be introduced to the producers. A study was conducted by Dilmagani and Hemati (2013) with the aim of evaluating the effect of different growing media on nutrient uptake and quantitative and qualitative yield of greenhouse strawberries. Five treatments including perlite-cocopeat at ratios of 0-100, 25-75, 50- 50, 25-75 and - 100 were used. Physicochemical characteristics and nutrient concentrations were measured, in addition to fruit yield. Comparison of growing medium treatments showed that the highest number of flowers and fruits was obtained in a perlite-cocopeat mixture at a ratio of 25-75%. The highest fruit yield was obtained in perlite-cocopeat treatments at ratios of

25-75% and 50-50%. The evaluation of qualitative characteristics of fruit showed that the highest value of dry matter and TSS of fruits was found in perlite-cocopeat (at a ratio of 0-100%). The highest nitrogen and potassium concentration were found in perlite-cocopeat (at a ratio of -100%). The fruits are grown in perlite-cocopeat (at a ratio of 0-100%) had the highest concentrations of calcium and magnesium compared to other treatments. In order to determine the effects of several growing media on the quantitative properties of some greenhouse cucumbers (Negin cultivar) and to examine the possibility of mixing perlite in different media, Ghaemi et al (2010) conducted an experiment. The results showed that many of the measured traits were significantly affected by the growing medium. According to the results, peat moss treatment with 299 g of fruit weight had the highest yield and leca treatment with 355 g of fruit weight had the lowest yield among the media. The highest and lowest number of fruits with a mean of 54 and 8 fruits, respectively, were obtained in peat moss and leca media, respectively. The highest plant height was observed in peat moss treatment with 179 cm and the lowest height treatment was found in leca treatment with 56.5 cm. The results also showed that perlite in growing media caused changes in most of the measured traits compared to pure perlite.

2. METHODOLOGY

2.1 EXPERIMENT DESIGN AND IMPLEMENTATION

This project was carried out in Noshahr city of Mazandaran province, with the latitude of 35 ° and 37 minutes North and a longitude 50 ° and 42 minutes East and height 2.9 meters above sea level. This experiment was conducted in a 21-month period from November 2016 to July 2018. (Aslanpour, 2018)

In order to investigate the effect of growing medium type, this study was carried out in the form of five experiments as follows. Investigation of the effect of growing media type on growth and flowering of Saintpaulia seedlings

This experiment was conducted as a factorial experiment in a completely randomized design with 3 growing media. Three growing media, including 1- peat 2- Cocopeat: Perlite with equal ratio and 3. Peat moss: Perlite with equal ratio (all growing media were sterilized in an autoclave before use at 121 ° C, at 1 atm, for 20 minutes) were evaluated on two Rapsody and Optimara cultivars with 5 replications. These treatments were fed regularly and weekly with solid fertilizer 20:20:20.

3. PLANT MATERIALS

Seedlings resulting from tissue cultivation of three cultivars of Optimara, Rapsody and Tong wensis in the 6 to 7-leaf stage with 0.7 cm diameter produced in the tissue cultivation laboratory of Noshahr were used in this study.

3.1 THE CONTROL OF ENVIRONMENTAL FACTORS

From the recorded laboratory temperature, the maximum temperature was set at 25°C in the day and 18°C at night. The relative humidity of the environment was set on 45-55%.

4. MEASUREMENT OF MORPHOLOGICAL TRAITS

The number of leaves of each treatment was counted after the completion of each experiment period. The total number of flowers appearing on the plant was observed by repeated observations during the plant growth period and until the end of the experiment period. The total number of buds appearing on the plant during the experiment was counted. The number of flowering branches of each treatment was counted after each experiment period. The number of days to flowering per plant was carried out with repeated notetakings during the plant growth period and until the end of the experiment period. The longevity of flowers in each plant was recorded by frequent notetaking during the flowering period since observing the full-opened flower until flower full beauty maintaining. The diameter of flowers was measured by using calipers and the mean diameter was used in statistical analysis. The leaf area was measured using the Digimizer software. The root of plants was exposed to the oven at 70 ° C for 48 hours and their dry weight was measured. The number of flowers in each inflorescence in each plant was counted separately. The time distance between observing the

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first bud and the appearance of the last flower on the plant was measured. The time distance between flowering periods since the end of each flowering period until the beginning of the next period was measured. The height of each plant was measured with a ruler from the surface of the potting soil. The length of each inflorescence in each plant was measured using a ruler.

5. STATISTICAL ANALYSIS

Minitab®16 Statistical analysis software is employed and the comparison of the means was performed based on Tukey's test at 5% probability level. The charts were plotted with Excel software.

Table 1: Analysis of variance (mean square) and the effect of growing media and cultivar on morphological traits of Saintpaulia.

Source of variations	df	Mean square													
		Number of leaves	Number of flowers	Number of buds	Number of the flowering branches	Number of days to flowering	Flower longevity	Flower diameter	Leaf area	Root dry weight	Number of flowers in inflorescences	Flowering period	Distance between flowering periods	Plant height	Inflorescence length
Growing medium	2	4.172**	6.193**	6.193**	8.26**	2.1666**	0.21**	6.3**	4.48**	4.7**	1.8**	4.342**	5.2254**	7.277ns	4.22**
cultivar	1	6.45**	0.124**	0.124**	5.38**	5.918**	1.34**	4.2**	0.73**	2.0**	3.0ns	8.1228**	1.128**	9.430ns	8.26**
Interaction effect of growing medium and cultivar	2	0.18**	23.8**	2.8**	93.4**	4.126ns	2.0 ns	5.0ns	3.7**	1.0ns	1.0ns	7.140**	5.54**	5.239ns	04.1**
error	24	1.1	9	9	2	6.116	3	1	1	3	8	9.1	6.9	220	8

ns, *, and ** , respectively, are non-significant, significant at a probability level of 5% and 1% based on the Tukey's test

6. RESULTS AND DISCUSSION

The investigation was made to observe the effect of cultivation medium and cultivar on growth and flowering of Saintpaulia. The results of the analysis of variance showed that the effect of cultivar on most of the measured traits in Saintpaulia was significant. Growing medium treatments had a significant effect on traits such as number of leaves, number of flowers, number of buds, number of flowering branches, number of days to flowering, flower diameter, flower longevity, leaf area, root dry weight, number of flowers in inflorescence and inflorescence length. However, they do not have a significant effect on plant height. The effect of cultivar on all traits, except for a number of flowers in inflorescence and plant height, was significant Table 1. The results of the analysis of variance and comparison of the mean values of data showed that the interaction effect of growing media and cultivar treatments had a significant effect on most traits, but they do not have a significant effect on the traits such as number of days to flowering, plant height, flower longevity, flower diameter, root dry weight and number of flowers in inflorescence.

Table 2: Comparison of the mean effect of growing medium on morphological traits of Saintpaulia

Growing medium	Traits												
	Number of leaves	Number of flowers	Number of buds	Number of flowering branches	Number of days to flowering	Flower longevity (days)	Flower diameter (cm)	Leaf area (cm^2)	Root dry weight (g)	Number of flowers in the inflorescence	Flowering period (day)	Distance between flowering periods	Inflorescence length
peat	4.8 c	4.5 c	4.7 c	4.2 c	7.78 a	9.2 c	9.0 c	11.2 c	0.1 c	0.2 c	3.10 c	4.50 a	7.4 c
Cocopeat: perlite	8.12 b	7.9 b	7.11 b	4.3 b	0.62 b	3.4 b	6.1 b	4.4 b	8.1 b	9.2 b	9.15 b	4/.30 b	0.6 b
Peat moss: perlite	7.16a	2.14 a	2.16 a	6.5 a	3.53 b	8.5 a	1.2 a	5.6 a	7.2 a	8.3 a	0.22 a	0.21 c	7.7 a

The means that have one shared letter in each column have no significant difference at the 1% probability level according to Tukey's test

Table 3: Comparing the mean effect of cultivar on morphological traits of Saintpaulia under the growing medium treatments

Cultivar	Traits											
	Number of leaves	Number of flowers	Number of buds	Number of flowering branches	Number of days to flowering	Flower longevity (day)	Flower diameter (cm)	Leaf area (cm2)	Root dry weight (g)	Flowering period (day)	Distance between flowering days	Inflorescence flower length (cm
Rhapsody	11.4b	11.8a	8.13 a	4.9a	59.1b	5.4a	1.8a	5.9a	1.7b	22.4a	31.8b	5.2b
Optimara	13.8a	77.b	7.9 b	2.6b	70.2a	3.2b	1.3b	2.8b	1.9a	9.6b	36.0a	7.1a

The means that have at least one common letter in each column have no significant difference according to the Tukey's test at 1% probability level.

6.1 NUMBER OF LEAVES

The results of the analysis of variance showed that the effect of growing medium on the number of leaves

was significant at 1% probability level. The simple effect of cultivar and the interaction effect of growing medium and cultivars were also significant at 1% probability level (Table 1). The results of the comparison of the mean values of data also showed that the highest number of leaves was observed in the peat moss: Perlite in Optimara cultivar with a mean of 16.4 leaves and peat moss: perlite in Rhapsody cultivar with a mean of 15.1 leaves, which did not show significant difference with cocopeat: perlite growing medium in Optimale cultivar with 14.4 leaves, but it had a significant difference with other growing media. The lowest number of leaves was observed in the peat growing medium in Rhapsody cultivar with a mean of 6.2 leaves, which had a significant difference with other growing media (Figure 4.1).

Ideal physical characteristics in the peat moss: Perlite growing medium increases the growth of the plant by providing suitable conditions, thereby increasing the growth and the number of leaves compared to other media. The cocopeat growing medium, compared to peat moss, also reduces the oxygen content of the root by increasing the water content, which can be a factor in reducing growth in this medium compared to peat moss. These results are in line with the results of the research conducted by Salhshoor (2014) on Saintpaulia and Ghamari et al. (2015) on Matthiola plant.

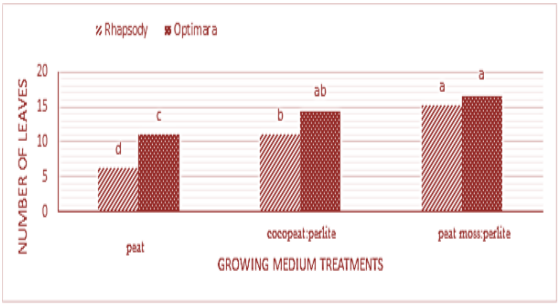

Figure 1: Interaction effect of cultivar and growing medium on the mean number of leaves in Saintpaulia.

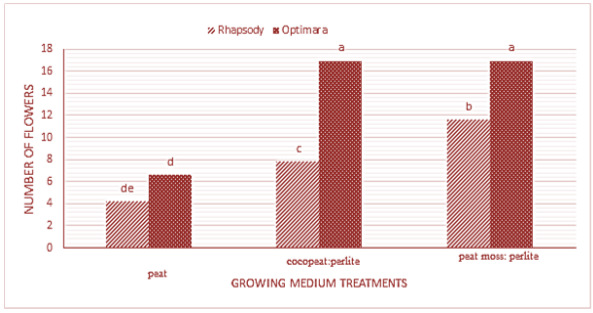

Figure 2: Interaction effect of growing media and cultivars on the mean number of flowers in Saintpaulia.

6.2 NUMBER OF FLOWERS

The results of the comparison of the mean values of data also showed that the highest number of flowers was seen in the cocopeat: perlite medium in optimara cultivar with a mean of 17.2%, which showed significant difference with other growing media. The lowest number of flowers was found in peat growing medium in Rhapsody cultivar with a mean of 4.2, which had no significant difference with Optimara cultivar (Figure 2). The effect of growing medium on increasing the number of flowers was probably due to the increased intake of food and the ease and availability of food for hairy roots and due to the high intake of nutrients in the peat moss: Perlite and cocopeat: Perlite media. This issue is seen more in peat moss medium than cocopeat medium due to increased oxygen demand and the elements needed for plant growth. These results are consistent with the results of the research conducted Roosta et al (2015) on rose and Ghamari et al. (2015) on Matthiola plant.

6.3 NUMBER OF BUDS

The results of the comparison of the mean values of data showed that the highest number of buds was seen in the peat moss: perlite growing medium and in Optimare cultivar with a mean of 18.9 buds, which showed a significant difference with other growing media. The lowest number of buds was seen in Rhapsody cultivar and in peat growing medium with a mean number of 6.2, which showed no significant difference with peat growing medium and Optimara cultivar but showed significant differences with other growing media (Figure 3).

Generally, due to the increased intake of food and the ability to maintain more nutrients by growing media, the nutrients essential for plant growth are provided for root. With increasing the amount of water available to the plant, the number of open stomata will be more, transpiration will be more, and the soluble potassium in the food will be absorbed more. For this reason, vegetative and reproductive growth is increasing in non-soil growing media and accordingly, the number of buds will be greater. These results are consistent with the results of the research conducted by Roosta et al (2015) on the rose.

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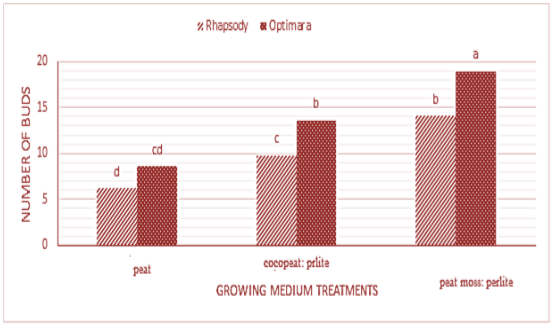

Figure 3: Interaction effect of growing medium and cultivars on a mean number of buds in Saintpaulia.

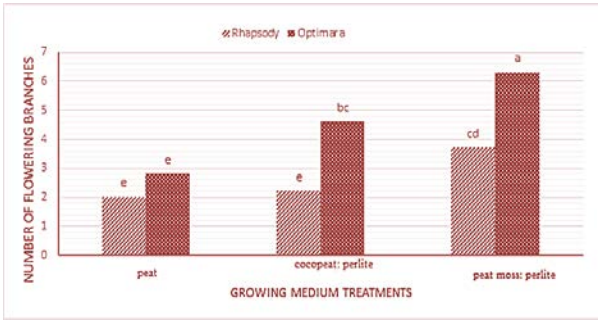

Figure 4: Interaction effect of growing medium treatments and cultivar on the mean number of flowering branches in Saintpaulia.

6.4 NUMBER OF FLOWERING BRANCHES

The results of comparison of the mean values of data also showed that the highest number of flowering branches was seen in peat moss: perlite growing medium and in the Optimara cultivar with a mean number of 6.3, which had a significant difference with other growing media. The lowest number of flowering branches was seen in Rhapsody cultivar and in the peat growing medium with a mean of 2 flowering branches, which had no significant difference with peat growing medium with a mean of 2.8 in the Optimara cultivar and cocopeat: perlite growing medium in Rhapsody cultivar (Figure 4). The use of cocopeat and perlite and the use of peat moss: perlite increases the porosity and amount of oxygen in the growing medium, which can increase vegetative and reproductive growth. With increasing reproductive growth, the number of flowering branches increases in the plant. These results are consistent with the results of the research conducted by Ghamari et al. (2015) on the Matthiola plant.

6.5 NUMBER OF DAYS TO FLOWERING

The results of the analysis of variance showed that the effect of growing medium effect and the simple effect of cultivar was significant at 1% probability level. The interaction effect of growing medium treatments and cultivar was not significant (Table 1). The results of the comparison of the mean values of data on the simple effect of growing medium showed that the highest number of days to flowering was seen in the peat growing medium with 78.7 days, which had a significant difference with other treatments. The lowest number of days to flowering was seen in the peat moss: Perlite growing medium with 53.3 days, followed by cocopeat: Perlite with a mean of 62 days, which showed no significant difference with other treatments (Table 2). The results of the comparison of the mean values of data on the simple effect of cultivar on the number of days to flowering showed that the highest number of days to flowering was observed in Optimara cultivar with a mean of 70.2 days, which had a significant difference with other varieties (Table 3).

In general, non-soil growing media increase plant growth rate by providing nutrients for plant and the plant's access to them. This will increase the rate of flowering in the plant, and the plant will complete its vegetative phase faster and enter the reproductive phase, leading to a reduced number of days to flowering in the plant. The presence of oxygen in the root of the plant is also necessary to improve the growth rate of the plant and affects the rate of plant metabolism. These results are consistent with the results of the research conducted by Salahshoor (2014) on the Saintpaulia.

6.6 LONGEVITY OF FLOWERS

The comparison of the mean values of data on the simple effect of growing media showed that the highest flower longevity was observed peat moss: perlite growing media with a mean of 5.8 days, which has a significant difference with other growing media. The lowest flor longevity was observed in the peat growing medium with a mean of 2.9 days, which had a significant difference with other media (Table 2).

The results of the comparison of the mean values of data on the effect of the cultivar showed that the highest flower longevity was seen in the Rhapsody cultivar with a mean of 4.5 days and the lowest flower longevity was seen in Optimara cultivar with a mean of 3.2 days. A significant difference was seen between the two cultivars in this regard (Table 3).

6.7 FLOWER DIAMETER

The interaction effect of cultivar and growing media treatments was not significant (Table 4). The results of the comparison of the mean values of the data on the simple effect of the growing medium showed that the highest flower diameter of was seen peat moss: perlite growing medium with a mean of ½ cm, which showed a significant difference with other growing media. The lowest flower diameter was observed in the peat growing medium with a mean of 0.9 cm, which showed significant differences with other growing media (Table 2). The results of the comparison of mean values of data on the simple effect of cultivar showed that the highest flower diameter was observed in Rhapsody cultivar with a mean of 1.9 cm. The lowest flower diameter was seen in Optimara cultivar with a mean diameter of 1.30 cm (Table 3).

Among all of the flowering parameters, the role of the growing medium is more important. A medium with appropriate physical properties provides more oxygen in the root environment, and accordingly increase the soil air, leading to increased crop yield and reproductive growth. The effect of growing medium in increasing the diameter of the flower is due to the increased intake of food and the availability of food for the hairy roots of the plant and due to the high intake of nutrients in these media. These results are consistent with the results of Salahshoor (2014) on Saintpaulia.

6.8 LEAF AREA

The results of the comparison of the mean values of data also showed that the highest leaf area was observed in peat moss: Perlite and in Rhapsody cultivar with a mean of 9.11 cm2, which showed a significant difference with other growing media. The lowest leaf area was found in the peat growing medium and in Rhapsody cultivar with a mean of 1.42 cm2, which showed a significant difference with other treatments (Figure 5).

In a proper growing medium, the ratio of air and water is approximately equal. Plants need water and elements at an optimal and suitable level to have good growth and yield. Water or air storage capacity depends on the porosity of the cultivation elements. Cocopeat has high water storage capacity and contains high levels of foods and relatively acidic environment. Over time, tannins and some of the acids in the cocopeat enter the food solution and cause problems. For this reason, peat moss, compared to cocopeat, is a growing medium with desired physical characteristics for the plants. It also provides desirable vegetative growth and increases the number of leaves and leaf area. These results are consistent with the results of the research conducted by Salahshoor (2014) on the Saintpaulia and Roosta et al (2015) on the rose.

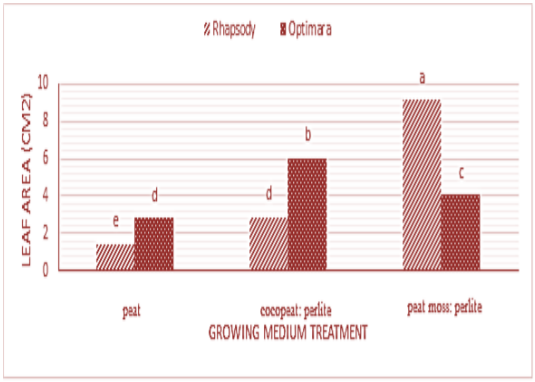

Figure 5: Interaction effect of growing media and cultivar on the mean of leaf area in Saintpaulia

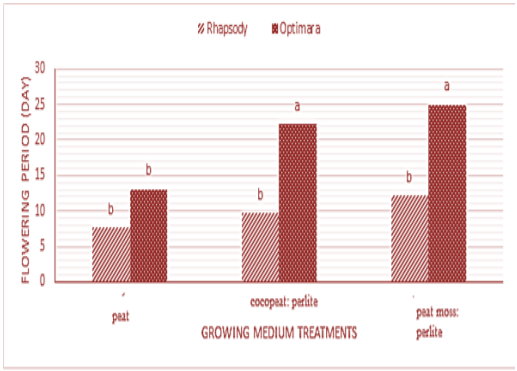

Figure 6: Interaction effect of growing media treatments and cultivar on the mean flowering period of Saintpaulia

6.9 ROOT DRY WEIGHT

The results of the analysis of variance showed that the effect of growing media treatments and cultivar were significant at 1% probability level (Table 1). The results of comparison of the mean values of the data in investigating the simple effect of the growing medium showed that the highest root dry weight was observed in peat moss: perlite growing medium with a mean of 2.7 g, which had a significant difference with other growing media. The lowest root dry weight was found in the peat growing medium with a mean of 1 g, which

had a significant difference with other treatments (Figure 2). The results of the comparison of mean values of the data in investigating the simple effect of cultivar showed that the highest root dry weight was observed in Optimara cultivar with a mean of 1.9 g. The lowest root dry weight was seen in Rhapsody cultivar with a mean of 1.7 g, which had a significant difference with other cultivars (Table 3). Generally, proper density and suitable ventilation porosity of the growing medium with its effect on oxygen availability in the root environment have an important role in improving the growth and development of the root. These results are in line with the results of the research conducted by Salahashoor (2014) on the Africa violet and Ghamari et al (2015) on Matthiola plant.

6.10 NUMBER OF FLOWERS IN INFLORESCENCES

The results of the analysis of variance showed that the effect of growing media treatments was significant at 1% probability level. The effect of cultivar and the interaction effect of growing media treatments and cultivars were not significant (Table 1). The comparison of the mean values of the data on the effect of growing media showed that the highest number of flowers in the inflorescence was observed in the peat moss: perlite growing medium with a mean of 3.8, followed by cocopeat: perlite with a mean of 2.9. These two growing media had a significant difference in terms of a number of flowers in an inflorescence. The lowest number of flowers in inflorescences was found in the peat growing medium with a mean of 2 (Table 2).

Generally, peat moss growing medium has good properties such as lightness, chemical neutrality, and suitable conditions in terms of moisture and air storage capacity. For this reason, it can increase the number of flowers in inflorescences. These results are consistent with the results of the research conducted by Alaei et al. (2014) on Chrysanthemums.

6.11 FLOWERING PERIOD

The results of the analysis of variance showed that the effect of growing medium treatments and cultivar on the flowering period was significant at 1% probability level. The interaction effect of growing media treatments and cultivar was significant at 1% probability level (Table 4-1). The results of comparison of the mean values of data also showed that the highest flowering period was observed in peat moss: Perlite and in Optimara cultivar with a mean of 24.9 days, followed by cocopeat: Perlite in Optimara cultivar with a mean 22.2 days. The lowest flowering period was observed in the Rhapsody cultivar in the peat growing medium with a mean of 7.6 days (Figure 1-6). Cocopeat, Perlite, and peat moss increase the energy by storage of nutrients, which are provided for the plant when needed. This leads to storage of energy for the plant, and the plant uses it during its growth period, leading to a longer flowering period. These results are consistent with the results of the research conducted by Alaei et al. (2014) on Chrysanthemums.

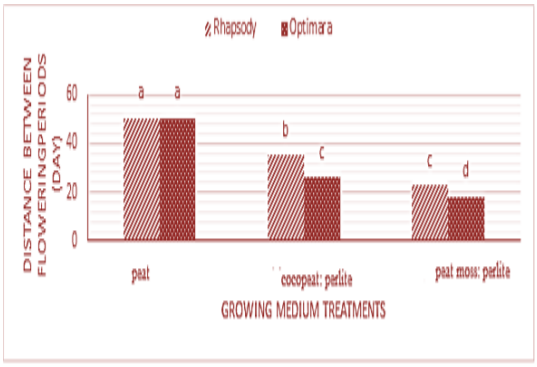

Figure 7: Interaction of effect of growing media treatments and cultivar on mean distance between flowering periods in Saintpaulia.

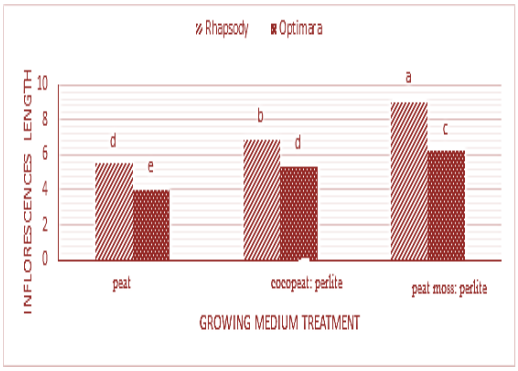

Figure 8: Interaction effect of growing media and cultivar on the mean length of inflorescences in Saintpaulia.

6.12 DISTANCE BETWEEN FLOWERING PERIODS

The results of the analysis of variance showed that the simple effect of growing medium treatments and simple effect of cultivar were significant at 1% probability level. The interaction effect of cultivar and the growing medium was significant at the probability level of 1% (Table 3). The results of comparison of the

mean values of data also showed that the maximum distance between flowering periods was seen in the peat growing medium and Rhapsody cultivar with a mean of 50.4 days and the peat growing medium in Optimara cultivar with a mean of 50.4 days, which had a significant difference with other growing media. The lowest distance between flowering periods was seen in peat moss: Perlite growing medium in optimara cultivar with a mean of 18.3 days, which had significant differences with other treatments (Figure 7).

6.13 PLANT HEIGHT

The results of the analysis of variance showed the simple effect of growing media treatments and the simple effect of cultivar and the interaction effect of growing medium and cultivar was not significant (Table 1).

6.14 INFLORESCENCE LENGTH

The results of the comparison of the mean values of data also showed that the highest inflorescence length was observed in peat moss: Perlite growing media and in Rhapsody cultivar with a mean of 9 cm, which showed a significant difference with other treatments. The lowest inflorescence length was found in Optimara cultivar and in the peat growing media with a mean of 4 cm, which had a significant difference with other treatments (Figure 8).

Due to the presence of more water in the root environment in the cocopeat compared to peat moss, the amount of air available to the root decreases. As a result, peat moss provides more oxygen available to the plant's root than cocopeat. For this reason, the lack of oxygen seems to have an effect on all cell energy-demanding processes, such as the absorption of elements, guiding the plant juice, the growth of meristem cells, which reduces plant height. These results are consistent with the results of the research conducted by Alaei et al. (2014) on Chrysanthemum.

In general, Saintpaulia requires a suitable growing medium for proper flowering and growth, so that most of the measured traits related to plant growth and flowering in the peat moss: Pearlite growing medium had the best values compared to other media. These results indicate that the use of this growing medium along with the use of essential elements such as nitrogen, phosphorus, and potassium, increases the growth and development of the plant. These results are consistent with the results of the research conducted by Salahshoor (2014) on the Saintpaulia.

7. CONCLUSION

Saintpaulia due to its fine root system requires a light growing medium with good ventilation and drainage porosity. For this reason, peat moss: perlite growing medium with the lowest density and highest ventilation porosity is a proper medium for vegetative and reproductive growth of this plant so that all traits measured in this medium have the best values compared to other media. In this experiment, peat moss: Perlite growing medium showed better growth and higher flowering in Saintpaulia. Cocopeat: perlite growing medium has also somewhat been able to maintain the appearance characteristics of the plant, but the peat growing medium slowed growth stopped growth to some extent in this plant due to lack of sufficient porosity as well as the constant storage of moisture in the root environment. Moreover, the flowering of the plant in this medium was not enough to maintain the beauty of the plant.

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