Advances in Bioresearch
Adv. Biores., Vol 7 (1) January 2016: 108-112
©2015 Society of Education, India
Print ISSN 0976-4585; Online ISSN 2277-1573
Journal's URL:http://www.soeagra.com/abr.html
CODEN: ABRDC3
ICV Value 8.21 [2014]

Advances in Bioresearch

ORIGINAL ARTICLE

Effects of Different Growing Media on Growth of Pot Plant *Peperomia Magnolifolia*

Nahid Jangjou Basmanj[1]*, Ahmad Khalighi[2], Elham Matlabi[3]
Islamic Azad University of Tehran, Science and Research Branch, Tehran, Iran
Scientific Board at University of Tehran, Tehran, Iran
Scientific Board at Islamic Azad University of Garmsar Branch, Semnan, Iran
* Corresponding author: Nahid7675@yahoo.com

ABSTRACT
In order to find out the effect of different growing media on growth of pot plant Peperomia Magnolifoliaan experiment on different levels of growth media was conducted as factorial in completely randomized design with three replications in the greenhouse of the flower clinic at 21st district in Tehran municipality at the spring of 2014. The treatments included different growth media as 50% garden soil + 25% Perlite + 25% Vermicompost; 25% garden soil + 50% perlite + 25% Vermicompost; 25% garden soil + 25% perlite + 50% Vermicompost; 50% garden soil + 50% perlite + 50% Vermicompost; and 50% perlite + 50% Vermicompost. Properties such as the length of the stem, leaf number, dry and wet weight of shoot and root, chlorophyll and soluble sugar were evaluated. The results unveiled that the effect of the application of different growth media in all evaluated properties was significant. The treatment of 50% garden soil + 50% perlite showed the highest effect on the whole evaluated properties and the treatment of 50% garden soil + 25% Perlite + 25% Vermicompost showed the lowest effect.
Keywords*: growth media, perlite, Vermicompost, garden soil, Peperomia Magnolifolia*

Received 02/10/2015 Accepted 21/12/2015

How to cite this article:
Nahid J B, Ahmad K, Elham M .Effects of Different Growing Media on Growth of Pot Plant *Peperomia Magnolifolia* . Adv. Biores., Vol 7 [1] January 2016: 108-112**.** DOI: 10.15515/abr.0976-4585.7.1.108112

INTRODUCTION

Growth media is the environment holding the root and providing the water and food for it [1]. To grow the plant in pots, the soil or porous material in the pot should have special conditions. To provide proper soil in pot culture, four elements should be considered including plant establishment, ventilation, food preservation and humidity maintenance should be considered. One of the main and basic factors in selecting materials in preparing pot mix is that no poisonous materials should be involved. Pot growth developers often add rectifier materials to the mineral soils such as leaf composts, animal manures, peat, wood ash, sand and gravel. Use of soil due to the problems of lack of control factors such as CEC declined. Suitable reaction products can be controlled media to improve growth conditions [2]. A proper growth media not only should have desirable physiochemical and biological properties, but also must be available, low-priced, sustained, and sufficiently low-weighted in order to work easily and the transportation shall be economically reasonable.

Less usage of non-renewable materials like peat is necessary. In addition, it is required to reuse fresh organic wastes of municipalities with high volume and low cost such as compost. These materials can replace a portion or all of peat as a medium for pot culture [3]. Researches carried out on medium of the ornamental leaf plant shave shown that a great number of mixed medium produce Plants with high quality, however, there is considerable variation between different species. Soil physical properties that affect the growth of potted plants included air conditioning, the ratio of carbon to nitrogen, cation exchange capacity and the water holding capacity that these properties can be balanced by varying the percentage composition of the growth medium [4]. *Peperomia Magnolifolia*is one of the sensitive plants to the growth medium and having problem to grow in nature and involves parts of capital and workforce. The plant is grown in greenhouses on soil substrates, yet no suitable growth medium that has the greatest

economic benefit and best environmental specifications have been set so far. The aim of the present study was to select the appropriate growth medium and its effect on the properties of this plant and introduce it to the producers.

MATERIALS AND METHODS

In order to find out the effect of different growing media on growth of pot plant *Peperomia Magnolifolia*, an experiment on different levels of growth media was conducted as factorial in completely randomized design in three replications. The treatments included different growth media including 50% garden soil + 25% Perlite + 25% Vermicompost; 25% garden soil + 50% perlite + 25% Vermicompost; 25% garden soil + 25% perlite + 50% Vermicompost; 50% garden soil + 50% perlite + 50% Vermicompost; and 50% perlite + 50% Vermicompost. This experiment was done from the late September 2013 to late May 2014. The research was done in a greenhouse with polyethylene protection located in Tehransar, Tehran City with geographic profile of 49" E 46.51" 15 '35 42 11 29 " N.

The temperature of 18 degree Celsius and relevant humidity of 70% was set for the growth. The soil tissue was loam sandy. The water holds 765Mz electrical current and pH of 8.06. First, the soil mixture containing the above media was prepared and then each *peperomia* flower was planted in pot number four containing the above mixture. The organic and mineral materials used in this study were composed of Vermicompost (v), perlite (p), and soil (s). Rooted cuttings of the *peperomia* flowers that reached the 6-leaf stage were planted in pots 4. Six treatments with three replications were done in each 2 of the two pots. The irrigation was done once every two days. The picking was done nine months after planting the plant in the pots to do the following measurements.

Measurements

At the time of planting, plant height, mean of leaf area were recorded. In the harvesting time, the plant tall, leaf area, number of leaves, Internode length, number of branches, wet and dry weight of the root, chlorophyll and the soluble sugar were evaluated based on Arnone *et al* [5].

Wet and Dried Weight of the Bush

To determine the wet weight, root has been removed from the crown and the weight of the plant shoot was measured using a digital scale with a precision of a hundredth of a gram was measured. Plant dry weight was recorded after drying them in the oven at 80 ° C for 72 hours.

Wet and Dried Weight of the Root

To determine the wet weight, shoot has been removed from the crown and the weight of the plant root using a digital scale with a precision of a hundredth of a gram was measured. Plant dry weight was recorded after drying them in the oven at 80 °C for 72 hours.

Analysis

After implementation of the project and data collection, statistical analysis was performed using SPSS software. Comparison of means and the correlation of the attributes were determined by Duncan's multiple range tests at 1%. Excel software was used to plot the graph.

RESULTS

ANOVA table shows the significance of the effect of different treatments on all Laboratory and apparent traits (Table 1 & 2).

Table 1: Analysis of variance of effects of effects of different growing media on growth properties of *Peperomia Magnolifolia*

Resource of changes	D.F.	Wet weight of shoot	Dry weight of shoot	Wet weight of root	Dry weight of root	length of Stem
Treatment	5	13.849	0.073	1.122	0.016	9.308
Experimental error	-	0.014	0.002	0.019	0.002	0.03
Coefficient of variation (%)	-	9.97	13.70	16.25	14.34	14.69

*،**and ns is significant at probability level of 1 and non-significant at 5 %, respectively

Table 2: Table for variance analysis of the apparent and laboratory properties

Resource of changes	D.F.	freedom Number of leaves	Soluble of sugar	Chlorophyll a	Chlorophyll b	chlorophyll total
Treatment	5	2.375	3.985	0.119	0.022	0.246
Experimental error	-	0.01	0.022	0.004	0.0006	0.004
Coefficient of variation (%)	-	2.375	3.985	19.3	111.1	15.96

*،** and ns is significant at probability level of 1 and non-significant at 5 %, respectively

Results showed that the growth medium of 25% soil, 25% perlite and 50% vermicompost showed significant difference as compared to other growth media. The highest wet weight of shoot was observed in 50% soil and 50% perlite and the lowest wet weight of shoot was seen in medium of 25% soil + 25% perlite + 50% vermicompost (Figure 1, right).

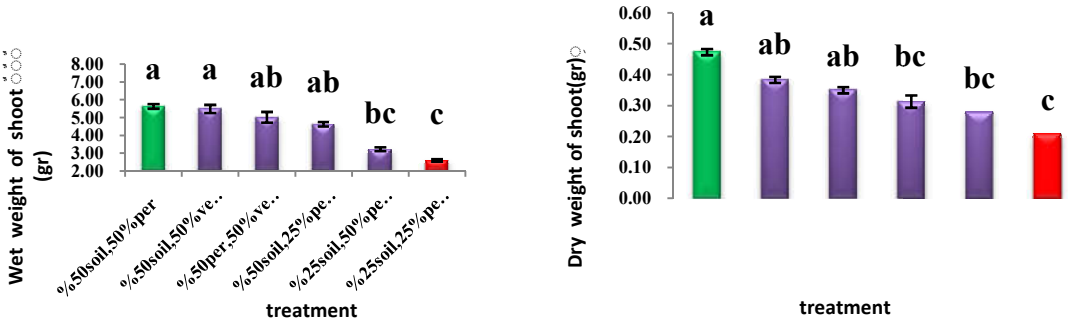

Figure1- Effects of different levels of medium on dry (left) and wet (right) weight of shoot

Statistical data indicated that the medium of 25% soil, 25% perlite and 50% vermicompost showed significant difference compared to other growth media. the highest dry weight of shoot was observed in 50% soil and 50% perlite and the lowest dry weight of shoot was seen in medium of 25% soil + 25% perlite + 50% vermicompost (Figure 1, left).According to graph 3-4, the growth medium of 25% soil, 25% perlite and 50% vermicompost showed significant difference as compared to other growth media. The highest wet weight of root was observed in 50% soil and 50% perlite and the lowest wet weight of root was seen in medium of 25% soil + 25% perlite + 50% vermicompost (Figure 2, right).

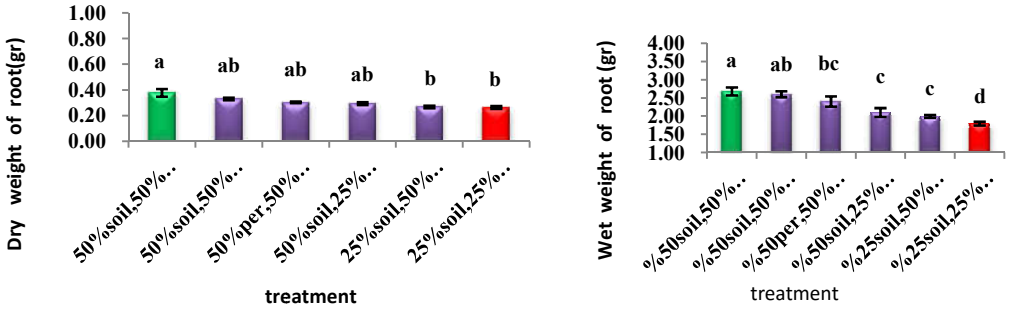

Figure2- Effects of different levels of medium on dry (left) and wet (right) weight of root

The highest dry weight of root was observed in 50% soil and 50% perlite and the lowest dry weight of root was seen in medium of 25% soil + 25% perlite + 50% vermicompost (Figure 2, left). The findings also conveyed that all the growth media are significantly different to each other. The highest stem height was observed in 50% soil and 50% perlite and the lowest stem length was seen in medium of 25% soil + 25% perlite + 50% vermicompost (Figure 3, left) which is in line with the study of Al-menaei et al, 2008. Based on the results, the growth medium of 50% soil + 50% perlite shows significant difference as compared to other growth media. The largest number of new leaves was observed in 50% soil and 50% perlite and the least number of new leaves was seen in medium of 25% soil + 25% perlite + 50% vermicompost (Figure 3, right). The growth medium of 50% soil + 50% perlite show significant difference as compared to other growth media. The highest chlorophyll a was observed in 50% soil and 50% perlite and the lowest chlorophyll a was seen in medium of 25% soil + 25% perlite + 50% vermicompost (Figure 4, right). Based on figure 8, all the growth media are significantly different to each other. The highest chlorophyll b was observed in 50% soil and 50% perlite and the lowest chlorophyll b was seen in medium of 25% soil + 25% perlite + 50% vermicompost. All the growth media are significantly different to each other (figure 5, left). The highest total chlorophyll was observed in 50% soil and 50% perlite and the lowest total chlorophyll was seen in medium of 25% soil + 25% perlite + 50% vermicompost. All the growth medium of 25% soil, 25% perlite and 50% vermicompost show significant difference as compared to other growth media (figure 5, right). The highest soluble sugar was observed in 50% soil and 50% perlite and the lowest soluble sugar was seen in medium of 25% soil + 25% perlite + 50% vermicompost which is consistent with Fotouhi Qazvini *et al* [6] (figure 4, left).

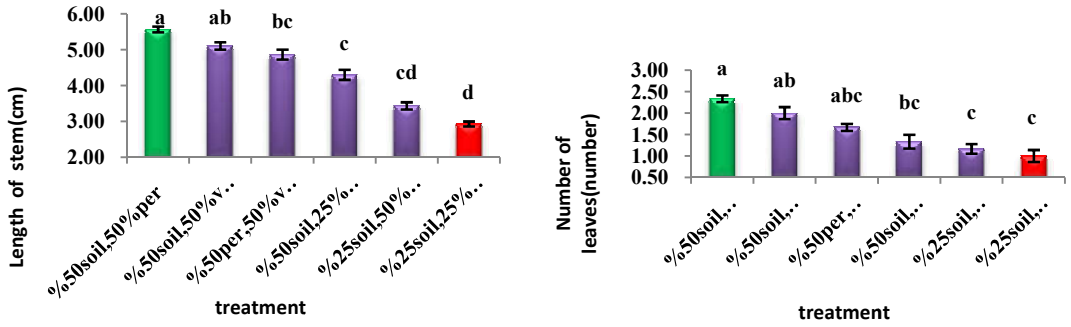

Figure3- Effects of different levels of medium on length of stem (left) and number of leaves (right)

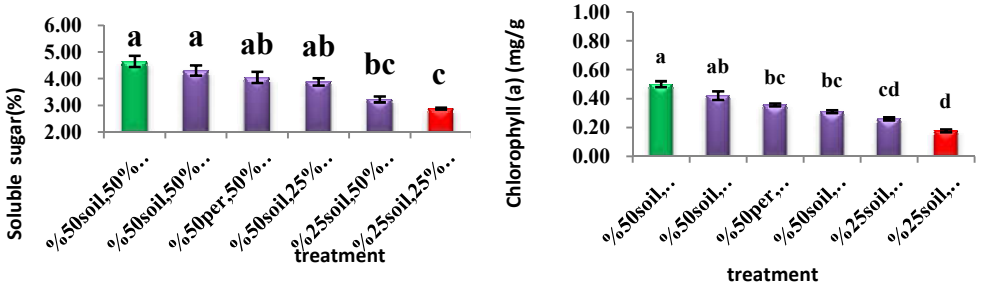

Figure4- Effects of different levels of medium on soluble sugar (left) and chlorophyll a (right)

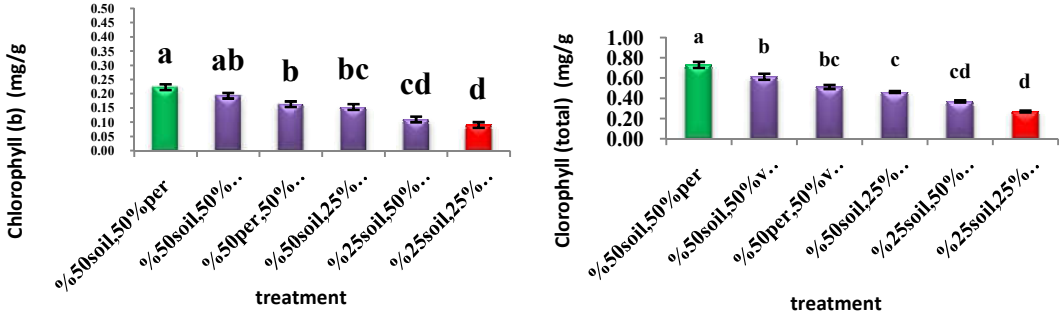

Figure5- Effects of different levels of medium on chlorophyll b (left) and total chlorophyll (right)

DISCUSSION

Application of perlite medium due to improving the soil physical and vital processes enhances the growth of shoots and eventually increases the number of leaves by creating an appropriate medium for root growth. As it was shown in the results section, in this experiment, application of perlite showed a considerable increase in all the measured properties including wet and dry weight of root and shoots, number of leaves, soluble sugar, chlorophyll a and b and the total chlorophyll. In *peperomia*, in more penetrative soil, root and stem are protected from rot. It should be emphasized that the application of perlite and increase in soil ventilation as compared with other growth media, provides plant available water easily and more and faster reactions can be done in the target tissue hence increasing photosynthesis power, and the probability of more water absorption for leaves and aerial parts of the plant gets more. As it was observed in this study, the growth media of 50% perlite +50% soil played more effective role than other growth media in increasing biochemical, and morphological traits of *peperomia*. Due to improving the soil physical and vital processes, the application of perlite medium enhances and accelerates oxidation reactions and chloroplast rehabilitation, improves chlorophyll structure, and transforms the light energy to active electrons and chemical activities. It also stimulates the Rubisco activase set, Hill reactions, and restores iron cytochrome and liberates full energy electrons and cytochrome activity which ultimately all this leading to the increasing in photosynthesis of the plant. In fact, growth medium of 50% perlite and 50% soil enhances the photosynthetic system of plant and therefore increases all relevant morphological and biochemical traits of the plant.

Perlite and its effects on the improvement of physical conditions of the soil and enhancement of photosynthesis in the plant is directly related to the reactions and nitrogen metabolism and its fixation. It enhances the activity of nitrate reductase, glutamate dehydrogenase, glutamine and glutamic and increases the nitrogen contents in the plant. Nitrogen is one of the main components of the proteins and

chlorophyll. Intensifying the nitrogen fixation of the plant by catalyzing activities, it is expected that plants treated by this medium, show more contents of chlorophyll a, chlorophyll b and total chlorophyll and soluble protein. Fotouhi and Qazvini [6]) applied different types of perlite and zeolite growth media for the plantation of strawberry and observed that the volumetric composition of 3 to 1 and 1 to 1 of perlite-zeolite improves the performance of the plant and increases the fruits. The pure zeolite medium decreases = number of fruits and the pure perlite medium increases the soluble solid materials and the chlorophyll. They explained that perlite with its characteristics such as high porosity and the high water capacity leads to growth enhancement and the improvement in gardening and crops. The results of other studies has shown that desirable effects of perlite is due to change of physical condition of growth medium and also regulation of the needed water for the plant and increasing the humidity capacity of the soil [7].The wet weight of stem is directly related to the amount of available water in the growth medium. Therefore, power of leaf to absorb water and nutritional materials decreases in the media with low water capacity ability significantly. Moreover, the available water of the plant decreases and together with the decrease in carbohydrate and water in the plant, the number of leaves, leaf area and the weight will be affected seriously. In this experiment, highest wet and dry weight of root, wet and dry weight of shoot, number of leaves, soluble sugar, chlorophyll a, chlorophyll b and total chlorophyll were observed in growth medium of 50% perlite + 50% soil. Plant needs the best medium to get the best growth conditions. Therefore, peperomia due to having stronger defense system and performance have better growth condition in growth medium of 50% perlite + 50% soil. The results showed that the crops grown in pumice and perlite have a good quality and no apparent disease such as leaf blight.There is a close and direct relationship between the increases in height, wet and dry weightof the shoot and the amount of photosynthesis. In this experiment, plants treated by this medium showed better performance as compared with plants treated under other media. Al-menaei *et al* [8] studied effects of different substrates, including various ratios of soil, sand, perlite and peat moss on the growth of Gardenia jasminoides under dry conditions and stated that the most of crown was in the medium of composition of soil and perlite (1: 1), the highest level of chlorophyll was in the medium of soil and peat moss mixture, the largest number of branches and flower was soil mix and perlite (1: 1) and maximum leaf area was the medium with soil. Regarding the results taken from the study, the treatment of 50% perlite + 50% soil showed greatest growth signs in terms of the measured parameters.

Based on the results of this present study, the highest wet and dry weight of root, wet and dry weight of shoot, number of leaves, soluble sugar, chlorophyll a, chlorophyll b and total chlorophyll were observed in growth medium of 50% perlite + 50% soil that this issue could be related to difference between media in terms of creating appropriate growth conditions including humidity, ventilation and other physiochemical traits of the plant. Therefore, regarding the positive effects of growth medium of 50% perlite + 50% soil in increasing the performance of the plant, application of this medium as a strategic plan and commercial production in this plant is recommended to producers.

REFERENCES

1. Davidson, H., R. Mecklenburg and Peterson, C. (1998). Nursery management: Administration and Culture. Second ed. Prntice_ Hall. New Jersey. 173 pp.
2. Drakes, D., Briercliffe, T., Lightfoot-Brown, S., Arnold, D. and Mackay, N (2001). The use and disposal of growing media. ADAS Horticulture Park Farm Ditton, Aylesford, Kent ME20 6PE.
3. Giovannini, C., D. Montecchio and O. Francioso (2008). Characterization of different growing media – compost based for ornamental plants by TG - DTA and FT– IR.
4. Conover, C.A. and R.T. Poole (1990). Light and fertilizer recommendations for production of acclimatized potted foliage plants.Univ. Fla. CFREC-A Res. Rpt. RH-90-1.
5. Arnone, A., Nasini, G., and Vajna, de P. O. (1997). Marasmane sesquiterpenes from the basidiomycete Clitocybe hydrogramma. Phytochemistry 46: 1099- 1101.
6. Fotouhi Ghazvini, R., G. Payvast. and Azarian, H (2007). Effect of clinoptilolitic-zeolite and perlite mixtures on the yield and quality of strawberry in soil-less culture. International Journal of Agriculture & Biology PP: 885-888.
7. Javanpur heravi, a., M. Babalar., P. A. Tiles., D. Mir Abdul & M. AS. Askari (2009). The effectiveness of different types of hydroponic nutrient solution and bed planting system on quantitative and qualitative characteristics of varieties of greenhouse tomato cultivar "Hamra" (In Persian)
8. Al-menaei, H.S., A.A. Al-Shatti and N. Suresh (2008) Effect of Growing Media on Growth and Flowering Pattern of *Gadenia Jasminoides* under Arid Condition. European Journal of Scientific Research. Vol 24. No 1. Pages 69-73.