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# Effect of different media on chlorophyll and carotenoids of ornamental plants under system mist

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**ABSTRACT**

*An important factor in the growth medium of plants and chemical plants. native substrates can be used to improve plant performance. To evaluate the effect of growth medium on Padanus sanderi and Rosmarinus officinalis experimental design was completely randomized with eight treatments and four replications were carried out in the research greenhouse of Islamic Azad University of Jiroft. The results of these tests indicate that the media different were effective on production of Photosynthetic pigments of Padanus sanderi and Rosmarinus officinalis. Higher values of chlorophyll a, b were total, carotenoids and sum pigments in levels of 50% peat palm + 25% sand + 25% perlite, with averages of 11.35, 7.43, 18.78, 3.47 and 22.25 mg.ml$^{-1}$. Add 25% sand + 25% perlite substrates on growth indices such as photosynthetic pigments Padanus sanderi and Rosmarinus officinalis were obtained, The highest value obtained in other indexes which show pure increase in beds with sand + perlite to grow their substrates. Higher values of chlorophyll a, b were total and sum pigments in levels of 50% peat moss + 25% sand + 25% perlite, with averages of 14.94, 7.26, 22.21 and 26.21 mg.ml$^{-1}$ for Rosmarinus officinalis.*

**Keyword:** Carotenoids, Chlorophyll, *Padanus sanderi*, *Rosmarinus officinalis*, Substrates.

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## INTRODACTION

The commercial production of the ornamental plants is a world business. Their economical value has significantly increased in the past two decades and there is much potential for continuous flower culture in future either in local markets or in international ones. The Netherlands excels in exports of ornamental plants including potted plants such as Begonia, Ficus, Cyclamen, Philodendron, Saintpaulia, Spathiphyllum and Rhododendron [13]. Iran has just commenced serious investment to produce ornamental plants. The main investment was done by private sector and the government just participates indirectly in producing lawns, flowers, shrubs and the ornamentals. It may be said that only 5 percents of the production is performed by the public section and the rest (95 percents) by the private sector [9]. One of the objectives of the developing countries is to achieve the stable economical growth. Flowers and the ornamentals are of the products attainable in many parts of Iran and enjoy high capability on foreign currency earning and can be placed as one of the main non-oil goods in country exports. During the recent decades, the development world trade of ornamental plants caused to propel the advanced countries to perform specialized researches in the field of these products [4]. The selection of the cultivation bed is an important and effective factor on the quality of seedling [8]. The first criterion for a commercial cultivation bed is optimal

growth of the plants and the continuous accessibility in an economic manner. Commercial cultivation bed should reserve water with suitable drainage and preparing appropriate placement of roots, should be devoid of toxic materials, pests and diseases [7]. The producers need cultivated bed which is permanent and stable, accessible, easily usable and reasonable in cost. The optimal physical and chemical features of the cultivation beds and their compounds are among the features that are of main concern. The main physical features are the total percent of porosities, the capacity of water reservation, the percentage of air porosities, volume density, distribution and the particle size. The main chemical features include pH, concentration ofsoluble salt and the cation exchange capacity [6].

The cultivation bed should be penetrable and have adequate strength and stability to hold the plant. Numbiar and Fife [11] and Oliet et al [12] reported that by optimizing the physical conditions of soil, the bed of seed will cause an increase in the seed germination, the growth of the root and seedling growth. Faraz et al [5] and Brito et al [2] found that adding organic materials of soil makes improvement of properties on germination percent, daily mean germination and germination rate. Griffin [6] reported that perlitee does not have any effect on the chemicalfeatures of the bed. The longest length of leaf was obtained under soil + tea wastes compound and the shortest length of leaf was obtained under soil + perlite medium [1].

The aim of this research was comparison of different growth beds on the chlorophyll and carotenoids of *Padanus sanderi* and *Rosmarinus officinalis* plant in kerman province.

## MATERIALS AND METHODS

The two experimental design was completely randomized with four replications of eight treatments. treatments to planting beds with sand + perlite that the combination was as follows:

1-100% peat moss
2-100% peat palm
3-100% cocopeat
4-100% cococheps
5-50% peat moss + 25% sand + 25% perlite
6-50% peat palm + 25% sand + 25% perlite
7-50% cocopeat + 25% sand + 25% perlite
8-50% cococheps + 25% sand + 25% perlite

**Prepare Media and Planting Plants**

Cocopeat commercial with the aim of reducing the cost of transportation, the compressed unit (block) supplied. Before applying this material the amount of water to opening up and voluminous, was added to it to have a completely uniform. The substrates peat moss, peat, palm cococheps nothing did not and the materials were used as primary. In treatments containing sand + perlite, these four types of seed bed volume ratio of 1:1 and mixed with sand + perlite were used. First of all pasteurized potting culture media with 2% sodium hypochlorite for disinfection were. First, of wooden cuttings in a bed of sand *Padanus sanderi* (used sucker) and *Rosmarinus officinalis* rooted in the greenhouse environment, then the rooted cuttings were transferred to pots with a diameter of 17 cm. the pots were filled with the material examined. After planting in pots in a greenhouse with temperature (winter 20-25 °C) and in summer (30-35 °C) were kept on planting plans. Growth of the indicator stem diameter, Plant Height and lateral shoot number, leaf area, specific leaf area and chlorophyll index was measured.

**Estimation of Chlorophyll and Carotenoids**

Photosynthetic pigments were measured using Lichtentaller method [10]. 0.2 g of fresh leaf tissue was weight by laboratory balance with accuracy of 0.0001gr and pulverized with mortar in the presence of 10ml of 80% acetone. The resulted solution was filtered through wattman filter paper mounted in glass funnel. The solution volume was increased to 15ml by addition of 80% acetone. 3ml of the solution containing chlorophyll a and b and carotenoid was poured in cuvet and its absorbance was measured in wavelengths of 663.3 nm (chlorophyll a), 646.8 nm (chlorophyll b) and 470 nm (carotenoids) using spectrophotometer device; concentration of the pigments were calculated using.

$Chl_a$ ($mg.ml^{-1}$) = (12.5 *A663.2)-(2.79* A646.8)

$Chl_b$ (mg.ml$^{-1}$) = (21.51*A646.8)-(5.1*A663.2)

Chl T (mg.ml$^{-1}$) = Chl.a + Chl.b

Car (mg.ml$^{-1}$) = (1000* A470)-(1.8* Chl.a)-(85.02* Chl.b

Where chl.a, chl.b, ch1 total and car are concentration of chlorophyll a, chlorophyll b and carotenoids (carotene and xanthophyll); and A663.2, A646.8 and A470 stand for absorbance in 663.2 nm (chlorophyll a), 646.8 nm (chlorophyll b) and 470 nm (carotenoids), respectively.

**Data Analysis**

Analysis was performed on data using SPSS 16. Comparisons were made using one-way analysis of variance (ANOVA) and Duncan's multiple range tests. Differences were considered to be significant at $P < 0.05$.

## RESULTS AND DISCUSSION

The results (Table 1) of these tests indicate that the media different were effective on production of Photosynthetic pigments of *Padanus sanderi*. Higher values of chlorophyll a, b were total, carotenoids and sum pigments in levels of 50% peat palm + 25% sand + 25% perlite, with averages of 11.35, 7.43, 18.78, 3.47 and 22.25 mg.ml$^{-1}$. Add 25% sand + 25% perlite substrates on growth indices such as photosynthetic pigments were obtained, The highest value obtained in other indexes which show pure increase in beds with sand + perlite to grow their substrates. Results for evaluations of chlorophyll of leaf showed that application of 50% peat palm + 25% sand + 25% perlite had a significant difference compared to the 100% peat moss media.

Lowest values of chlorophyll a, b were total, carotenoids and sum pigments were recorded in the treatment 50% cocopeat + 25% sand + 25% perlite with averages of 6.70, 3.23, 9.93, 2.28 and 12.21 mg.ml$^{-1}$ (Table 1).

**Table 1 - Effect of Different Potting Mixes on Photosynthetic pigments of *Padanus sanderi***

| Media | (mg.ml$^{-1}$Fresh Weight) | | | | |
|---|---|---|---|---|---|
| | Chl. (a) | Chl. (b) | Total Chl. a+b | Carotenoids | Sum pigments |
| 100% peat moss | 9.20c | 6.37b | 16.65b | 3.26a | 19.91b |
| 100% peat palm | 10.47b | 7.45a | 16.84b | 3.38a | 20.23b |
| 100% cocopeat | 8.32e | 4.28d | 12.60d | 3.20a | 15.80de |
| 100% cococheps | 8.25e | 4.26d | 12.51d | 3.06a | 15.57e |
| 50% peat moss + 25% sand + 25% perlite | 9.26d | 5.33c | 14.59c | 3.27a | 17.86c |
| 50% peat palm + 25% sand + 25% perlite | 11.35a | 7.43a | 18.78a | 3.47a | 22.25a |
| 50% cocopeat + 25% sand + 25% perlite | 6.70f | 3.23e | 9.93e | 2.28b | 12.21f |
| 50% cococheps + 25% sand + 25% perlite | 8.48e | 5.65c | 14.13c | 3.26a | 17.40cd |

*Means followed by same letter are not significantly different at P<0.05 probability using Duncan's test.*

**Table 2 - Effect of Different Potting Mixes on Photosynthetic pigments of *Rosmarinus officinalis***

| Media | (mg.ml$^{-1}$Fresh Weight) | | | | |
|---|---|---|---|---|---|
| | Chl. (a) | Chl. (b) | Total Chl. a+b | Carotenoids | Sum pigments |
| 100% peat moss | 8.32bc | 3.43b | 11.76b | 2.46b | 14.22b |
| 100% peat palm | 7.89bc | 2.27b | 10.17b | 1.78b | 11.95b |
| 100% cocopeat | 14.52a | 6.81a | 21.34a | 4.19a | 25.53a |
| 100% cococheps | 14.74a | 6.83a | 21.57a | 2.38b | 23.96a |
| 50% peat moss + 25% sand + 25% perlite | 14.94a | 7.26a | 22.21a | 4a | 26.21a |
| 50% peat palm + 25% sand + 25% perlite | 9.07bc | 2.87b | 11.94b | 2.37b | 14.31b |
| 50% cocopeat + 25% sand + 25% perlite | 9.30b | 2.30b | 11.60b | 3.03ab | 14.63b |
| 50% cococheps + 25% sand + 25% perlite | 6.97c | 2.58b | 9.55b | 2.11b | 11.66b |

*Means followed by same letter are not significantly different at P<0.05 probability using Duncan's test.*

The results (Table 2) of these tests indicate that the media different were effective on production of Photosynthetic pigments of *Rosmarinus officinalis*. Higher values of chlorophyll a, b were total and sum pigments in levels of 50% peat moss + 25% sand + 25% perlite, with averages of 14.94, 7.26, 22.21 and 26.21 mg.ml$^{-1}$. Add 25% sand + 25% perlite substrates on growth indices such as photosynthetic pigments were obtained, The highest value obtained in other indexes which show pure increase in beds with sand + perlite to grow their substrates. Results for evaluations

of chlorophyll of leaf showed that application of 50% peat palm + 25% sand + 25% perlite had a significant difference compared to the 100% peat moss media. Lowest values of chlorophyll a, total and sum pigments were recorded in the treatment 50% cococheps + 25% sand + 25% perlite with averages of 6.97, 9.55 and 11.66 $mg.ml^{-1}$ (Table 2). Lowest values of chlorophyll b and Carotenoids were recorded in the treatment 100% peat palm with averages of 2.27 and 1.78 $mg.ml^{-1}$ (Table 2).

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