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Research paper

Effect of Various Potting Media on Growth of Geranium Aralia (*Polyscias guilfoylei*)

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Abstract

The objective of the experiment was to study the effect of mixing silty soil (SS) with compost and leaf mould at different ratios on growth of *Polyscias guilfoylei*. Transplants were potted into polyethylene bags containing the following media: silty soil (SS), SS + compost (2 : 1), SS + compost (1 : 2), SS + compost (1: 1), SS + leaf mould (2 : 1), SS + leaf mould (1 : 2), SS + leaf mould (1 : 1). Data were collected on Plant height, number of leaves per plant, number of branches per plant, plant fresh and dry weights. Results revealed that the highest values of plant height, plant fresh and dry weights were associated with silty soil (SS). The highest values of number of leaves per plant was associated with SS + compost (1 : 1) and number of branches per plant with SS + compost (1 : 1) and (1 : 2).

Keywords: Polyscias guilfoylei, potting media, compost, leaf mould, growth.

تأثير أوساط تعبئة مختلفة على نمو نبات (*Polyscias guilfoylei*) Geranium Aralia

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المستخلص

الهدف من التجربة اختبار تأثير خلط التربة السلتية (ت. س) مع الكمبوست والأوراق المتحللة بنسب مختلفة على نمو نبات ال (*Polyscias guilfoylei*) Geranium Aralia. زرعت الشتلات في اكياس بلاستيك محتوية على الاوساط التالية: تربة سلتية، ت. س + كمبوست (2 : 1)، ت. س + كمبوست (2:1)، ت. س + كمبوست (1:1)، ت. س + أوراق متحللة (2 : 1)، ت. س + أوراق متحللة (2:1)، ، ت. س + أوراق متحللة (1:1). جمعت البيانات حول ارتفاع النبات، عدد الأوراق بالنبات، عدد الأفرع بالنبات، الوزن الطازج والوزن الجاف للنبات. أظهرت النتائج أن أعلى قيم لارتفاع النبات، وزن النبات الرطب والوزن الجاف تم الحصول عليها عند استخدام التربة السلتية (ت. س). أعلي قيم لعدد الأوراق بالنبات تم الحصول عليها عند استخدام ت. س + كمبوست (1:1) وعدد الأفرع بالنبات تم الحصول عليها عند استخدام ت. س + كمبوست (1:1) و (1:2).

كلمات مفتاحية: الاراليا، أوساط التعبئة، كمبوست، أوراق متحللة، النمو.

Introduction

Polyscias guilfoylei commonly known as coffee tree or Geranium Aralia belonging to family Araliaceae is a tropical plant native to southeast Asia. The showy leaves are often variegated with white or yellow margins or they can be all green. It is suitable for growing indoors as a houseplant, and it can be used as a bonsai specimen. It requires well-drained loamy acidic (pH<6.0) potting soil high in organic matter (Anonymous, 2020). In nursery production industry, a variety of growing media are in use worldwide, especially in the ornamental plant production. Growing media are an integral part of most horticultural production systems. There is a wide range of media available. Growing media are the substrates in which a plant will grow. They provide anchorage for the plant's roots; air spaces to allow respiration; and retain sufficient available water to enable plant growth. Potting soil mixes are the most important factors for the quality production of plants. Correct combination of substrates for growing media to optimize plant growth is demanding and represents about 4-6% of the cost of production for bedding plants (Khan *et al*., 2012). Organic materials from agriculture, forestry, green areas, and livestock farming as well as residues from municipal and industrial waste are rich sources of different nutrients (Fitzpatrick, 1986) and all have been strongly recommended for use as renewable

resources in pot production, an effort that would help to palliate their harmful impact on local and global environmental degradation (Ribeiro *et al*., 2007). The positive effects of organic amendments could be attributed to their effects in supplying the treated plants with their requirements of nutrients for relatively long time as well as their effects in lowering soil pH which could aid in facilitating availability of soil nutrients and improve physical characters in favour of roots development (Gamal and Ragab, 2005). The container medium for raising ornamental plants in most nurseries in the Sudan is the silty soil. Recently some nurseries have started using some imported potting media. Research on using potting media is very meager in Sudan. The objective of the experiment was to study the effect of mixing silty soil with compost and leaf mould at different ratios on growth of *Polyscias guilfoylei*.

Materials and methods

This study was conducted at the ornamental plants nursery of the Department of Horticulture, Faculty of Agriculture, University of Khartoum, Sudan, during the year 2013. *Polyscias guilfoylei* transplants were potted into polyethylene bags containing the following media: silty soil (SS), SS + compost (2 : 1), SS + compost (1: 2), SS + compost (1 : 1), SS + leaf mould (2 : 1), SS + leaf mould (1 : 2), SS + leaf mould (1 : 1). Leaf mould was mango leaves buried in the ground for tens of years under trees growing at the mango orchard of the Department of Horticulture. The compost was prepared by the Department of Soil and Environmental Sciences, Faculty of Agriculture, University of Khartoum. Some properties of the silty soil, compost and leaf mould which were determined at the laboratory of the same department, are shown in Table 1. A randomized complete block design was used. Three plants represented an experimental unit. Each experimental unit was replicated four times. Statistical analysis was carried out using the SPSS program (version 20/ 2014) and means were compared for significance by using Duncan's multiple range tests at 5% level of significance. Data were collected on Plant height, number of leaves per plant, number of branches per plant, plant fresh and dry weights.

Table (1): Some properties of silty soil, compost and leaf mould

Potting mix	pH	ECe ds/m	Ca meq/l	Mg meq/l	Na meq/l	K meq/l	SAR	N %	P Ppm
Silty soil	7.8	1.1	2.1	5.8	1.8	0.26	1.0	0.04	6.0
Compost	6.7	2.4	17.0	21.0	84.6	105.0	19.0	0.30	34.0
Leaf mould	7.9	4.19	9.9	7.2	24.8	0.40	8.0	0.59	15.0

Results and discussion

Excluding silty soil treatment, there was no significant difference in plant height among the rest of the treatments. Silty soil (SS) treatment resulted in the highest plant height differing significantly ($P \leq 0.05$) from all SS + leaf mould treatments (Table 2). Plant fresh weight was also significantly ($P \leq 0.05$) higher with Silty soil treatment compared to the rest of the treatments among which there was no significant difference (table 3). As shown in table 3 the highest plant dry weight (0.526 g) was also recorded by silty soil treatment with significant difference ($P \leq 0.05$) from the treatments SS + leaf mould (2 : 1) and SS + leaf mould (1 : 2). Results of plant height, plant fresh and dry weights are in agreement with those of Ahmad (1997) who studied the effect of five different soil mixes namely silty soil, SS + sand (2:1), SS + compost (2:1), SS + compost (1:2) and SS + compost (1:1) on growth of white Ixora, *Acalypha* and *Pedilanthus* plants and found highest plant height, plant fresh and dry weights associated with silty soil. Although the difference in number of leaves per plant and number of branches per plant among treatments was not significant, the treatment SS + compost (1:1) recorded highest values of these two parameters (Table 2). This result is comparable with that of Ahmad and Qasim (2003) who studied the effect of various potting media on growth response and nutrient uptake efficiency of *Scindapsus aureus* using farm yard manure, leaf mold, poultry manure in different combinations with sand, silt and saw-dust. Potting media in different combinations were better than sole one; as they revealed more growth and vigor. Riyaz *et al*. (2008) found no significant differences in number of leaves per plant between silty soil alone and silty soil amended with leaf manure and coconut compost in *Zinnia elegans*. However, silty soil amended with leaf manure and coconut compost resulted in significantly higher number of branches per plant than silty soil alone. Many research workers reported positive effects of organic amendments on growth of different plants (Nethra *et al*., 1999 in *Callistephus chinensis*, Khayyat *et al.*, 2007 in *Epipremnum aureum*, Kiran *et al*., 2007 in *Dahlia pinnata*, Gupta *et al*., 2014 in marigold, Riyaz *et al*., 2015 in *Gerbera jamesonii*, Ravishankar *et al.*, 2004 in papaya and Mumtaz *et al.*, 2006 in rough lemon). Depending on cost of media, silty soil or the mixture SS + compost (1:1) can be regarded as suitable potting media for *Polyscias guilfoylei*.

Table (2): Effect of different potting mixes on growth parameters of *Polyscias guilfoylei* twenty eight weeks after transplanting.

Potting Mix	Plant height (cm)	Number of branches/plant	Number of leaves/plant
Silty soil (SS)	76.33b	2.50a	35.50a
SS + compost (2:1)	66.00ab	2.50a	39.75a
SS + compost (1:2)	71.00ab	3.00a	43.25a
SS + compost (1:1)	68.75ab	3.00a	48.00a
SS + leaf mould (2:1)	63.25a	2.50a	35.75a
SS + leaf mould (1:2)	61.25a	2.50a	38.75a
SS + leaf mould (1:1)	64.42a	2.00a	46.00a

Means followed by the same letter/s in a column are not significantly different (P = 0.05) according to Duncan's Multiple Range Test.

Table (3): Effect of different potting mixes on growth parameters (fresh and dry weights) of *Polyscias guilfoylei* twenty eight weeks after transplanting.

Potting Mix	Plant fresh weight (g)	Plant dry weight (g)
Silty soil (SS)	0.732c	0.526b
SS + compost (2:1)	0.257ab	0.247ab
SS + compost (1:2)	0.470b	0.450b
SS + compost (1:1)	0.402b	0.355ab
SS + leaf mould (2:1)	0.258ab	0.217a
SS + leaf mould (1:2)	0.385ab	0.148a
SS + leaf mould (1:1)	0.252ab	0.249ab

Means followed by the same letter/s in a column are not significantly different (P = 0.05) according to Duncan's Multiple Range Test.

References

Ahmad, I. and Qasim, M. (2003). Influence of various potting media on growth and nutrient uptake efficiency of *Scindapsus aureus*. International Journal of Agriculture Biol., 5: 594–597.

Ahmad, M.I. (1997). Response of some potted ornamental plants to different soil mixes. MSc. thesis, Faculty of Agriculture, University of Khartoum.

Anonymous (2020). *Polyscias guilfoylei*. North Carolina Extension Gardener. Plant Tool Box. http://www. plants.ces.ncsu.edu/plants/polyscias-guilfoylei/. (Retrieved June 15, 2020).

Fitzpatrick, G.E. (1986). Sludge processing effects on compost quality. BioCycle, 27, 32- 35.

Gamal, A.M. and Ragab, M.A (2005). Effect of organic manure source and its rate on growth nutritional status of the trees and productivity of balady mandarin trees. *Assuit Journal of Agricultural Sciences*, 4:253-264.

Gupta, R.; Yadav, A. and Garg, V.K. (2014). Influence of vermicompost application in potting media on growth and flowering of marigold crop. Int J Recycl Organ Waste Agri 3(1): 1–7.

IBM Corp., 2014. IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp. Available at: https://hadoop.apache.org.

Khan, Z.; Tiyagi, S.A.; Mahmood, I. and Rizvi, R. (2012). Effects of N fertilization, organic matter and biofertilizers on the growth and yield of chili in relation to management of plant-parasitic nematodes, Turkish Journal Botany, 36, 73-81.

Khayyat, M.; Nazari, F. and Salehi, H. (2007). Effects of different pot mixtures on pothos (*Epipremnum aureum* Lindl. and Andre 'Golden Pothos') growth and development. Am-Eurasian J Agric Environ Sci 2:341–348.

Kiran, M; Din, J.; Waseem, K.; Jilani, M.S. and Khan, M.Q. (2007). Effect of different growing media on the growth and development of Dahlia (*Dahlia pinnata*) under the agro-climatic condition of Dera Ismail Khan. Pak J Biol Sci 10:4140–4143.

Mumtaz, M.K.; Azam, M.k.; Mazhar, A.; Muhammad, J.; Jaskani, M.A. and Haider, A. (2006). Evaluation of potting media for the production of Rough lemon nursery stock. Pakistan Journal of Botany, 38(3), 623-629.

Nethra, N.N.; Jayaprasad, K.V and Kale R.D. (1999). China aster (*Callistephus chinensis*(L)) cultivation using vermicompost as organic amendment. Crop Research Hisar, 17(2), 209–215.

Ravishankar, H.; Karunakaran, G. and Srinivasamurthy, K. (2004). The performance of Coorg Honey Dew papaya under organic farming regimes in the Hill Zone of Karnataka. International Symposium on Papaya Acta Horticulture, 851, 283-289.

Riyaz, A.; Arshad, M.; Younis, A.; Raza, A. and Hameed, M. (2008). Effects of different growing media on growth and flowering of *Zinnia elegans* cv. Blue point. Pak J Bot 40 (4) :1579–1585.

Riyaz, A.; Younis, A.; Ghani, I.; Tariq, U. and Ahsan, M. (2015). Agricultural waste as growing media component for the growth and flowering of *Gerbera jamesonii* cv. hybrid mix. Int J Recycl Org Waste Agricult 4: 197–204.

Ribeiro, H.M.; Romero, A.M.; Pereira, H.; Borges, P.; Cabral, F. and Vaconcelos, E. (2007). Evaluation of a compost obtained from forestry wastes and solid phase of pig slurry as a substrate for seedlings production. Bioresource Technology, 98, 3294-3297.