Effects of Different Growth Media on Shoot Development of *Dracaena fragrans* (Linn)

✉[1]M. O. Oluwafemi, [2]O. B. Adewoyin, [3]O. M. Olosunde, [4]E. E. Esiet and [5]S. D. Fagbayide

[1&2]*Department of Horticulture and Landscape Technology; Federal College of Agriculture, Akure*
[3]*Department of Horticulture, Federal University of Agriculture, Abeokuta, Nigeria;*
[4]*Department of Agricultural Extension and Farm Management, Federal College of Agriculture, Akure, Nigeria;*
[5]*Department of Agricultural and Bio-Environmental Engineering, Federal College of Agriculture, Akure, Nigeria*
✉*Corresponding author: pstfemimatthew@yahoo.com*
GSM Number: 08037115902

Accepted on June 20, 2014

Abstract
Africa continent is endowed with varied and unique ornamental plants which cannot be found in other parts of the world. Most of these indigenous ornamental plants species are becoming endangered and fast-disappearing due to diverse human activities such as road construction, bush burning, deforestation, continuous cropping, use of herbicide to mention a few. Sustainable conservation of indigenous plants therefore needs to be promoted. The study was conducted at Federal College of Agriculture, Akure, Ondo State, Nigeria to investigate the effects of different growth media on shoot development of Dracaena fragrans (Linn) an indigenous ornamental plant whose habitat is being lost to different athropogenic activities. The treatments consisted of topsoil (TS), Sawdust (SD), poultry manure (PM) and River sand (RS) at different combinations by volume (3litre plastic container). Data on shoot parameters taken include; number of days to 50% bud - break, number of leaf per plant, number of branches per plant. The result showed that the highest mean value at 50% bud-break was recorded from cuttings planted in homogenous sawdust growth medium. Dracaena fragrans planted in topsoil + sawdust 1:1 (v/v) produced highest number of branches per cutting. Topsoil + poultry manure (1:1 v/v), poultry manure, and river sand had least effect on 50% bud-break, number of leaves and branches per plant. Dracaena fragrans grew better shoot in homogenous topsoil and sawdust media

Keywords: Growth media, rooting, shoot development, endangered, indigenous.

Introduction

Human activities such as road construction, bush burning, deforestation, continuous cropping, animal grazing to mention a few have led to the lost of many indigenous plant species in many agro-ecologies of African continent. These include some plants which can be utilized as food, medicine or landscape beautification such as *Chrysophyllum albidum, Parkia biglobosa, Adansonia digitata, Arvingia gabonensis, Spathoda campanulata, Thaumatococcus danielli* Dracaena *fragrans* and many others.

Dracaena fragrans belongs to the family Agavaceae and are important plants widely used for interior decoration across the globe. It is a native plant that is indigenous to North and South America and throughout tropical Africa, from Mozambique to Cote d'voire and

Angola, growing in unwanted regions (Bailey *et al*, 1960; Huxley, 1992). It is a slow growing shrub, usually multi-stemmed at the base, mature specimens reaching 15m or more tall with a narrow crown of usually slender erect branches. Stems may reach up to 30cm diameter on old plants (Keav and Hepper, 1972).

Dracaena fragrans is widely grown as a hedge ornamental plant. It is primarily popular as a house plant, valued for its tolerance of a wide range of indoor conditions from full sun to low light condition (Peak *et al.*, 1985). Study has shown that it helps to remove indoor air pollutants such as for formaldehyde, xylene and toluene *Dracaena fragrans* also help to remove hazardous substances from office and house furniture and interior decorations to keep the air purified (Wolverton, 1996). This plant among others needs to be domesticated and popularized. The focus of this study is to examine the effect of different growth media on shoot development of *Dracaena fragrans*. Young plants have a single unbranched stems with a rosette of leaves, the large stem produce 18-36 inch deep green blade leaves, with yellow striped down the center

Indoor plants have also been known to have a marked impact on human health and provide psychological benefits. A well planned and planted interior landscape encourages productive and effective activities and reduces aggressive tendencies. Dracaenas such as *Dracaena fragrans* is known worldwide for their attractive foliage colour, shape and their ability to reduce component of indoor air pollution and remove carbon (iv) oxide CO_2 which is correlated with lower work performance from indoor areas (Habibah *et al.*, 2008).

Several factors affects the growth and productivity of plants, but importance of a good growth medium for production of potted ornamental plants for interior and exterior decorations is paramount (Habibah *et al.*, 2008). Field soils commonly used for growing ornamentals are generally unsatisfactory because soils do not provide the aeration, drainage and water holding capacity required in the containers. Hence, this study examined effects of growth media on growth of *Dracaena fragrans* in the nursery.

Materials and Methods

The experiment was carried out at the nursery section of ornamental Horticulture garden of the Federal College of Agriculture, Akure, Ondo State in the rain forest zone of Nigeria between February-August, 2012. The mean annual rainfall is 1200 mm, while the temperature range is 22^{o}C and 28^{o}C. Treatment combination consist of Eight different growth media namely; Topsoil (TS), Cure Poultry Manure (PM), Sawdust (SD), River sand (RS), Top Soil + Poultry Manure 1:1 (TSPM),Topsoil + Sawdust 1:1 (TSSD), Topsoil + River sand 1:1 (TSRS), Topsoil + Poultry Manure + Sawdust + River sand 1:1:1:1 (TSPMSDRS). All media were mixed in proportionate ratio by volume in a 3litres plastic container. Stem cuttings (Cane) of 1m length of Dracaena plant were planted in pot filled with different growing media. All necessary cultural practices were carried out in the nursery. Chemical analysis before and after experiment were carried out. Data were collected at 12Weeks After Planting (WAP) and the readings were taken at two weeks intervals.

Data were collected on growth parameters, such as, Number of days required for 50% bud break, number of leaves per plant and number of branches per plant.

All the data collected on growth parameters were subjected to Analysis of Variance (ANOVA) and means separated using Duncan Multiple Range Test (DMRT) at $P \leq 0.05$ level of probability (Snedecor and Cochran, 1989).

Results and Discussion

Initial growth media analysis before planting

The result of chemical composition of growing media used in raising dracaena plant in the nursery before planting is presented in Table 1. The results of chemical analysis of growing media showed variation in the N, P, K content and pH of the different growth media used which explains why Dracaena responded differently.

Table 1: Analysis of the growth media used for the experiment

Growth Media	pH	O.C %	O.M %	N %	P Mg/Kg	K	Na	CaMg
						.....cmol/kg..... ►		
Top soil	6.43	3.33	5.75	1.66	49.70	0.56	0.54	17.20	5.8
Poultry manure	7.25	3.32	5.72	1.72	101.95	2.92	2.50	18.00	6.4
Sawdust	-	88.0	-	3.26	158.42	5.76	3.38	27.50	17.4
River sand	7.85	0.25	0.40	0.08	6.14	0.26	0.31	1.50	1.0
Topsoil + Poultry Manure	7.26	3.50	5.65	1.70	140.30	2.3	2.40	17.50	6.1
Topsoil + Sawdust	6.40	86.00	5.70	3.15	150.2	4.68	3.72	20.69	16.9
Topsoil + River sand	7.89	3.56	5.68	1.80	102.50	2.95	2.48	17.50	6.78
Topsoil + Poultry Manure + Sawdust + River sand	7.75	91.02	6.25	3.20	166.10	5.65	3.45	23.80	-

Number of 50% bud break, number of branches and leaves of *Drcaena fragrans* as affected by different growth media

Effects of growth media on number of 50% bud break and number of branches were significantly at ($p \leq 0.05$). *Dracaena fragrans* raised in sawdust growth medium had the highest mean number of bud break, followed by topsoil, while poultry manure had the lowest value (Table 2).

Table 2: Number of buds of Dracaena as affected by different growth media at 50% bud break

Treatments	Total	Means
Topsoil	19	6.33
Poultry manure	5	1.67
Sawdust	23	7.67
River sand	17	5.67
Topsoil + Poultry Manure	15	5.00
Topsoil + Sawdust	13	4.33
Topsoil + River sand	16	5.33
Topsoil + Poultry Manure + Sawdust + River sand	11	3.67

Similarly, cuttings planted in sawdust medium had the highest number of branches per cutting at 12 and 14 WAP. However, at 20 WAP homogenous topsoil and sawdust had the highest number of branches at 20 WAP. Cuttings in poultry manure medium only produced the least number of branches between 12 and 20 WAP (Table 3). Effect of growth media on number of leaves of *Drcaena fragrans* was not significant ($p \leq 0.05$).

Table 3: Number of branches of *Dracaena fragrans* at 12, 14, 16, 18 and 20 WAP.

Treatments	12WAP	14WAP	16WAP	18WAP	20WAP
Topsoil	6.33b	6.67a	6.67a	6.67a	6.67a
Poultry manure	1.67a	1.33a	4.67a	4.67a	4.67a
Sawdust	7.67b	7.67a	6.67a	6.67a	6.67a
River sand	5.67ab	6.33a	6.00a	6.00a	4.67a
Topsoil + Poultry Manure	5.00ab	5.33a	4.67a	4.67a	4.67a
Topsoil + Sawdust	4.33ab	4.33a	5.00a	5.00a	5.00a
Topsoil + River sand	5.33ab	5.67a	5.67a	5.67a	6.33a
Topsoil + Poultry Manure + Sawdust + River sand	3.67a	4.67a	4.33a	5.00a	5.00a

Treatment means in each column that are followed by the same letter are significantly different using Duncan Multiple Range Test at $p<0.05$.

The number of leaves of *Dracaena fragrans* as affected by different growth media

Among the treatments, there were no significant difference on the number of leaves at 12, 14, 16, 18 and 20 WAP.

Table 4: Number of leaves of *Dracaena fragrans* at 12, 14, 16, 18 and 20 WAP

Treatments	12WAP	14WAP	16WAP	18WAP	20WAP
Topsoil	21.33a	36.67a	38.33a	42.33a	45.67a
Poultry manure	7.00a	22.33a	28.00a	31.00a	35.33a
Sawdust	20.67a	30.33a	31.67a	35.67a	38.33a
River sand	9.33a	24.67a	26.33a	29.69a	32.00a
Topsoil + Poultry Manure	11.00a	17.00a	28.00a	37.00a	39.67a
Topsoil + Sawdust	17.33a	28.00a	37.67a	44.00a	46.00a
Topsoil + River sand	20.67a	30.33a	36.67a	39.00a	41.33a
Topsoil + Poultry Manure + Sawdust + River sand					

Growth media chemical composition after the experiment

There was decrease in the concentration of the chemical composition of different growth media both simple blended forms. Among the different growth media used in the experiment topsoil and Topsoil blended with Sawdust (1:1) pH were slightly acidic. However, there were general decreases in the composition when compared with the initial result.

Table 5: Chemical composition of different growth media after the experiment.

Growth Media	pH	O.C %	O.M %	N %	P Mg/Kg	K	Na	Ca	Mg
						◄.....cmol/kg.....►			
Topsoil	6.14	2.8	4.82	1.06	24.19	0.25	0.42	5.90	2.90
Poultry manure	7.3	2.68	4.62	1.62	78.56	1.34	1.82	17.30	6.0
Sawdust	-	58.21	-	1.20	142.01	4.00	2.32	26.40	10.0
River sand	7.61	0.23	0.40	0.06	5.29	0.15	0.16	1.0	1.6
Topsoil + Poultry Manure	7.11	3.0	5.31	1.32	103.5	2.00	2.00	16.0	5.87
Topsoil + Sawdust	6.02	79.80	4.92	2.88	110.1	4.33	3.18	18.50	15.72
Topsoil + River sand	7.05	7.89	5.20	1.65	97.6	2.50	2.09	15.02	5.39
Topsoil + Poultry Manure + Sawdust + River sand	7.00	88.7	6.00	3.00	124.5	5.11	3.04	19.05	15.02

Discussion

All the growth media in simple and blended form pH were within the range of 7.25 – 7.89, which is slightly alkaline, while that of the Topsoil and Topsoil + Sawdust ranges between 6.40 – 6.43, an indication of slightly acidic media, when observed confirmed Dauber (2011) that Dracaena plant will root in almost any kind of medium, regardless of the pH level.

The least value of Dracaena plant growth parameter number of branches and level pH level were found to be consistent with the initial nutrient composition of the poultry manure which though is not deficient nutrient wise, but may lack firmness to anchor the root for stabilized rooting and shoot development the better performance of sawdust growth media in sample and blended form with Topsoil as observed in the bud break, increasing number of branches and leaves could be traced to the nutrient concentration and combination of N, P, K, Ca and Mg which increased and consequently improved nutrient and water uptake in the plants.

Generally, the decrease in values of the chemical composition of different growth media can be attributed to nutrient uptake by plant and nutrient leaching off, as the pots which contain and hold the media and plants were regularly watered and kept moist throughout the period until the rainfall established which is in line with the work of Atta-Alla *et al*, (1996)

Conclusion and Recommendations

The findings from this study indicated that production of leaves in *Dracaena fragrans* was not affected by different growth media. Topsoil and sawdust media is recommended for good bud break and number of branches in the nursery. Further studies should be carried out on the effect of wetting regime and notching on the bud break and number of branches of stem cutting of Dracaena plant.

References

Atta-Alla, H., Zaghoul, M., Waly, A. K. and Khattah, S. H. (1996). Micro propagation of some ornamental plants in vitro culture and establishment of *Dracaena marginata* var. Tricolour, *Annals of Agricultural Science Mobstohor*. 34 (3): 1153 – 1162.

Bailey, L. H. and Bailey, E. Z. (1960). Horsus Bird. A concise Dictionary of Plants Cultivated in the United States and Canada 3rd Ed. Macmillan New York, Pp. 398.

Habibah. S. A., Al-Shatti A. A. and Suresh, N. (2008) Effect of Growing Media on Growth and Flowering Patterns of *Gardenia jasminoides* under Arid Conditions. *European Journal of Scientific Research Vol.24 No.1, pp.69-73*

Huxley, A. E. (1992). The New Royal Horticulture Society, Dictionary of Garden. (Dict. Guide), Second Edition. Pp 17 – 26.

Keay, R. W. J. and Hepper, F. N. (1972). Flora of West Tropical Africa, Ed. 2. (FWT) Pp. 62-64.

Kodza, F. and Vachunova, J. (1989). Propagation of Dracaena in vitro I Dracaena dermensis, Acta. Universtatis Agriculture Facultas Horticuturaea, 4(2): 33-37.

Kodza, F. and Vachunova, J. (1991). Propagation of Dracaena in vitro. II propagation of Draecaena cocina Kunth Acta. Universtatis Agriculture Facultas Horticulturea, 6(1): 51- 55.

Kunisahy, J. I. (1975). In vitro propagation of Cordyline terminals (L) Kunth *Hort. Science*. 10 (6): 601 -602.

McConnell, D . B. and Melendro, D.Y. (1988). Vertcal displacement of Dracaena fragrans ker-Gawl. Massangerana' cane. Proc. Fla. State Hort. Society. 101: 298- 300.

Paek, K. Y. , Okhi, M. O. and Chio, J. K. (1985) Mass propagation of Cordyline and Scindapsus in vitro Journal of the Korean society for Horticulture science, 26 (1): 83-92.

Snedecor, G. W. and Cochran, W. G. (1989). Statistical Methods. 8th Ed. Iowa State University Press, Iowa, U. S. A. Pp 507- XVI.

Wolverton, B. C. (1996). How to Grow Fresh Air. New York: Pengiun Books. 3rd. Ed. Pp 17- 24.