Effect of Six Levels of N on the Growth of Sanders Dracaena (*Dracaena sanderiana,* Hort.) at a 47 Percent Shade[1]

Saulo J. Rodríguez and Carlos Rivera-López[2]

ABSTRACT

Rooted cuttings of Sanders Dracaena (*Dracaena sanderiana,* Hort.) were grown in a 1:1 mixture of Cataño sand and peatmoss. They received regularly a mineral nutrient mixture containing variable levels of N in addition to P and K. After harvesting for a definite period of time, the data were analyzed by variance and through the fitting of the fertilizer-yield curve $Y = A/1 + B\ (C - X)^2$. The analysis reflected maximum yields of number of cuttings, total weight, root weight and total top growth with applications between 1200 and 1400 lb of N/acre/yr (aprox. 1300–1600 kg/ha/yr).

INTRODUCTION

The importance of the ornamental foliage plant in the agricultural economy has been reviewed elsewhere.[3] Work on the subject has been published by Samuels and Cibes,[4] and Cibes and Samuels.[5] More recently, the authors[3] studied the effect of the three main nutrients factorially distributed on the growth of the Sanders Dracaena. This work clearly established the importance of nitrogen and potassium nutrition on the growth of Sanders Dracaena. In this report the authors inform on the results obtained by applying six levels of nitrogen under 47% shade.

PROCEDURE

Three well rooted cuttings of Sanders Dracaena were placed in 5-gal glazed porcelain crocks. Each crock was filled with a 1:1 Cataño sand-peatmoss mixture. Each cutting measured approximately 9 in and weighed about 18 g.

[1] Submitted for Publication to Editorial Board Sept. 17, 1976.

[2] Horticulturist and former agronomist, respectively, Plant Breeding Department, Agricultural Experiment Station, College of Agricultural Sciences, Mayagüez Campus, University of Puerto Rico, Río Piedras, P. R. Suggestions by Dr. B. G. Capó and Mr. Mariano Antoni are deeply appreciated.

[3] Rodríguez, Saulo J. and Rivera-López, Carlos, Effect of the three levels of N, P, and K on the growth of Sanders Dracaena (*Dracaena sanderiana,* Hort). Submitted for publication in J. Agric. Univ. P. R.

[4] Samuels, G. and Cibes, H., Iron chlorosis on *Dracaena sanderiana,* J. Agric. Univ. P. R. 37: (4) 265–72, 1953.

[5] Cibes, H., and Samuels, G., Mineral deficiency symptoms displayed by *Dracaena godseffiana* and *Dracaena sanderiana* grown under controlled conditions, Agric. Exp. Sta., Univ. P. R., Tech. Paper 29, 1960.

N was supplied as ammonium sulfate while P and K were supplied as simple superphosphate and muriate of potash, respectively. Six N levels were mixed in the soil-peatmoss combination in the first application. At the same time, P and K at a rate of 400 and 800 pounds/acre/year were included in the application. From there on the nutrients were mixed together and spread on the surface every 3 months. Perlite was used as an inert carrier of the nutrients for uniform application.

All treatments were placed under a 47% shade propylene lath. They were distributed in a balanced incomplete block design, each block consisting of two treatments. Five replicates of each treatment were included in the experiment making a total of 30 plots.

The explants were harvested when a commercial cutting could be obtained from each plant, leaving a 4½-inch stump. Thereafter, the cuttings were harvested as soon as they were of commercial size leaving an additional 2½ inches of stem on the new attachment.

All cuttings were weighed and measured. The leaves were removed and the 4th, 5th and 6th leaves from the top were subsequently used for nutrient element chemical analyses.

The data were analyzed through variance. Also, the fertilizer-yield equation $Y = A/1 + B\ (C - X)^2$, was fitted to the means.[6]

RESULTS AND DISCUSSION

Table 1 presents the effect of N level on the growth of Sanders Dracaena. Table 2 and figure 1 present the fitting of the fertilizer-yield equation.

The levels of N applied to the growth media affected significantly the total number of harvested cuttings, total top and root growth, total weight of harvested cuttings, and the stem:root weight ratio. They did not affect the quality of the harvested cuttings as reflected by the mean weight and length per cutting, or the mean number of leaves per cutting. Neither the mean leaf weight nor the foliage:stem weight ratio were affected significantly by N level.

The influence of N level on the growth of the Sanders Dracaena is not linear. Thus, by fitting a curvilinear function like the fertilizer-yield equation $Y = A/1 + B\ (C - X)^2$, it is possible to estimate the minimum nutrient application needed for maximum yield. Table 2 presents the parameters obtained by fitting the equation. According to the results, it is possible to obtain 1958 cuttings/100 ft²/yr by applying 1383 lb of N/acre/yr (1595 kg/ha/yr). For the other information gathered, between 1200 and 1400 lb of N were needed to obtain the maximum yield. High

[6] Capó, B. G., Additional evidence on the applicability of the new fertilizer yield relation, J Agric. Univ. P. R. 51: (2) 97-120, 1967.

TABLE 1.—*Effect of six levels of nitrogen on growth and quality of* **Dracaena sanderiana**

N level		Harvested cuttings/100 ft²/yr	Total growth	Total top growth	Total root growth	Stem:root weight
Lb/acre/yr	*Kg/acre/yr*	*Number*	*Kg/100 ft²/yr*	*Kg/100 ft²/yr*	*Kg/100 ft²*	
0	(0)	1258 c[1]	28.84 c	24.53 c	4.32 b	5.48 b
300	(136)	1434 bc	33.74 bc	28.05 bc	5.70 ab	5.08 b
600	(272)	1773 ab	45.06 ab	34.08 ab	6.97 a	5.07 b
900	(409)	1891 a	43.19 a	36.60 a	6.61 a	5.79 b
1200	(545)	1875 a	42.17 ab	35.63 a	6.53 a	5.53 b
2400	(1091)	1530 ab	34.64 abc	30.50 abc	4.11 b	7.35 a

[1] Means with one or more letters in common do not differ significantly at the 5% level.

TABLE 2.—*Results obtained by fitting the equation* $Y = A/1 + B(C - X)^2$ *to growth data of* **D. sanderiana** *experiment*[1]

N level[2]	No. of harvested cuttings/100 ft²/yr		Total weight/plot		Total growth/100 ft²/yr		Total top growth/100 ft²/yr		Total root growth/100 ft²	
	Y[3]	Y'[4]	Y	Y'	Y	Y'	Y	Y'	Y	Y'
Cwt			*g*		*Kg*		*Kg*		*Kg*	*Kg*
0	1257.96	1274.60	340.27	352.87	28.83	29.99	24.52	25.20	4.32	4.76
3	1434.30	1473.42	398.10	403.53	33.73	34.43	28.04	28.85	5.69	5.60
6	1722.63	1670.64	468.40	453.52	41.05	38.71	34.07	32.43	6.97	6.34
9	1891.30	1837.55	522.45	496.43	43.18	42.20	36.59	35.43	6.61	6.79
12	1875.29	1939.58	495.78	524.57	42.17	44.17	35.62	37.31	6.52	6.78
24	1530.30	1518.50	439.60	434.83	34.64	34.19	30.49	30.17	4.10	3.93
				Statistics of the fitted equations						
A	1957.87		532.10		44.40476		37.70485		6.85029	
B	0.00280		0.00244		0.00266		0.00251		0.00403	
C	13.83543		14.42614		13.42108		14.04167		10.43590	
C. D.	0.9638		0.9131		0.9242		0.9270		0.9048	

[1] $Y = A/1 + B\ (C - X)^2$ yield obtainable with the optimum nutrient application, *C*. *B* is a measure of variability.

[2] Nitrogen level in hundreds of pounds.

[3] Observed values.

[4] Y' = calculated values.

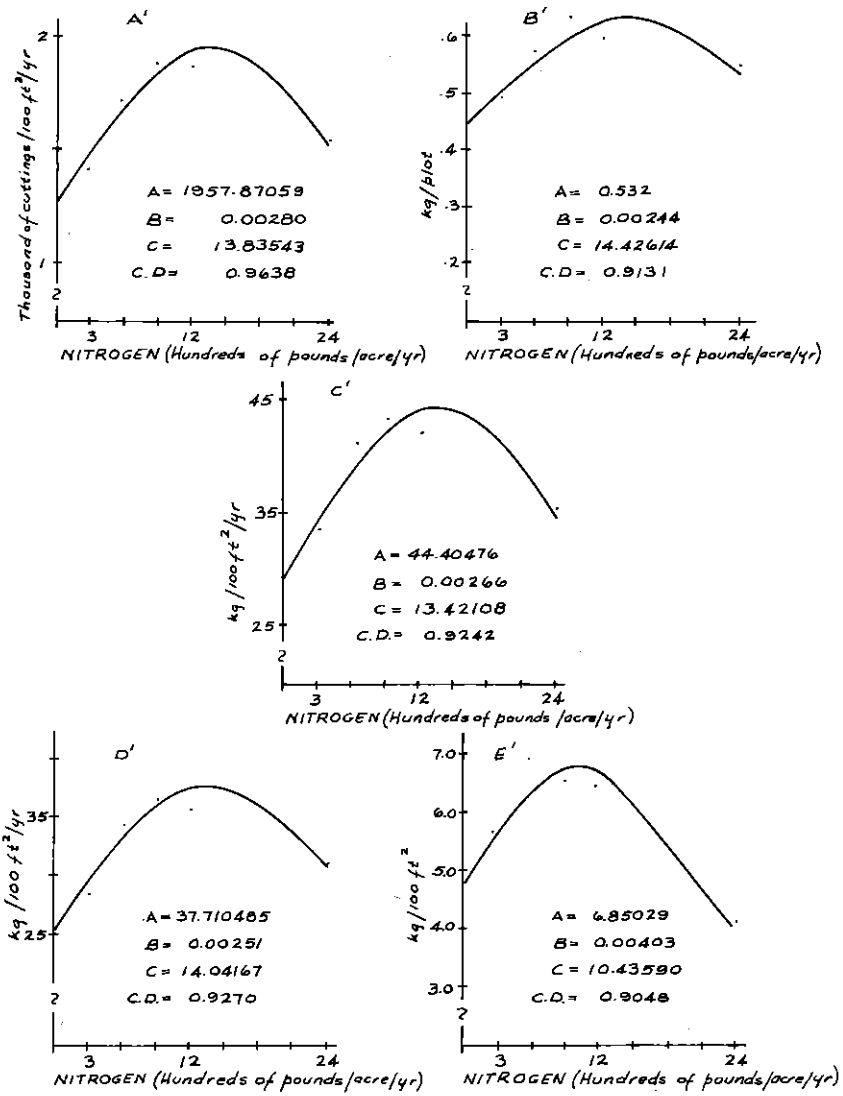

FIG. 1. —Graphical representation obtained by fitting the equation $Y = A/1 + B\ (C - X)^2$ to yield components, A' — number of harvested cuttings; B' — total weight per plot; C' — total growth; D' — total top growth; E' — total root growth.

coefficients of determination were obtained with the fitted curve, in five of the seven growth criteria studied, showing a general usefulness in explaining a yield variability.

In conclusion, the results showed a definite response to a high N application under the 47% shade used. In a previous trial with Sanders

Dracaena the effect of applying N was not so evident because it was confounded within five shade levels.

RESUMEN

Esquejes arraigados de Dracaena de Sanders (*Dracaena sanderiana*, Hort) se sembraron en una mezcla en proporción de 1:1 de arena Cataño y turba de pantano en tiestos de porcelana de 5 galones a un nivel de 47% de sombra. Los esquejes recibieron seis niveles de nitrógeno además de fósforo y potasio. Estos niveles consistían de 0, 300, 600, 900, 1200 y 2400 libras de nitrógeno por acre y año (0, 340.8, 681.8, 622.8, 1363.5 y 2727.2 kg./ha. y año). Se aplicaron 400 lb. de fósforo y 800 de potasio por acre y año (455 y 907.5 kg./ha. y año). Los esquejes de las distintas cepas se cosecharon por 32 meses. Se analizaron los datos estadísticamente por análisis de varianza y aplicando la curva abono-rendimiento $Y = A/1 + B\ (C - X)^2$. Hubo respuestas a los distintos niveles de nitrógeno. Los valores máximos para número de esquejes, peso total, peso total de esquejes y peso de las raíces a la condición mínima de nutrición se obtuvieron entre 1200 y 1400 lb. de nitrógeno por acre y año (approximadamente de 1300 a 1600 kg./ha. y año). La calidad del esqueje no fue afectada por los niveles de nitrógeno.