Table 2. Postharvest effects of light source and duration on chlorophyll content of *Ficus benjamina* held in light-and-temperature-controlled rooms for 12 weeks.

Treatment	Chlorophyll content (mg/cm^2 × 10^{-2})			
	Wk 1	Wk 4	Wk 8	Wk 12
Light system				
INC	4.2a[z]	3.7b	3.9c	3.9c
CWF	4.6a	5.2a	5.6a	6.1a
INC + CWF	4.1a	3.9b	4.4b	4.8b
Light duration				
6 hr/day	4.2a	4.3a	4.4a	4.8a
12 hr/day	4.3a	4.3a	4.5a	4.9a
18 hr/day	4.3a	4.2a	4.6a	5.0a
24 hr/day	4.4a	4.2a	5.0a	5.0a

[z]Mean separation within columns within treatment groups by Duncan's multiple range test, 5% level.

method after weeks 1, 4, 8, and 12 during the postharvest phase.

After 12 weeks indoors, the growth index was increased only when plants were held under INC lamps (Table 1). Dry weight was not influenced by light source but was increased when plants were lighted for 24 hr/day. Plants lighted for 24 hr/day had the least leaf drop, while plants lighted for 6 hr/day had the greatest leaf drop. Plant grade was highest under 24 hr/day light duration and was lowest under 6 hr/day. Plants maintained under the light combination decreased in leaf drop and increased in plant grade. Leaf drop was concentrated in the lower portion of the canopy when plants were held under CWF lamps, probably due to less light penetration downward, since only about 10% of the available light was transmitted to the plant midpoint. Plants under INC lamps lost leaves evenly throughout the canopy since as much as 25% of the light reached the plant midpoint. Other research (10) had reported a high level of transmittance of infrared and far-red radiation through leaves, while only about 10% of incident infrared-free white light was transmitted through the average green leaf. Plants held under the light combination retained foliage better than plants held under either single lamp source and retained more foliage in the lower portion of the plant than CWF alone. New internodes produced under INC lamps were elongated, similar to growth patterns found by others (3) in plants held under INC compared to other lamp sources with a lower red to far-red ratio. Increased light duration improved quality of *F. benjamina* under 20 μE m^{-2}s^{-1}. Other research (11) has shown improved plant performance of *E. pulcherrima* with increased total radiation provided by increased duration or light level.

Chlorophyll content was unaffected by the light source treatments after 1 week in the simulated interior environment (Table 2). Plants held under CWF lamps had the greatest chlorophyll content when sampled after 4 weeks, while content in plants sampled after 8 or 12 weeks decreased under light treatments in the following order: CWF > light combination > INC. Chlorophyll content was unaffected by light duration. Brown et al. (2) found increased Fe^{+3} reduction to Fe^{+2}, important in chlorophyll synthesis, under CWF lamps compared to low-pressure sodium (LPS) lamps containing no radiation below 550 nm. Chlorophyll content in lettuce and cotton was also greater under CWF lamps than under LPS (2). The spectral composition of CWF lamps may have improved production of chlorophyll in this experiment with *F. benjamina*.

The results of this study indicate that a light source composed of 50% INC/50% CWF will improve quality of *F. benjamina* by reducing leaf drop, preventing excessive elongated growth, and providing an adequate chlorophyll level for good foliage color. Under a low level of 20 μE m^{-2}s^{-1}, 24 hr/day light duration reduces leaf drop and increases quality retention.

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Light-induced Basal Branching of *Dracaena marginata*[1]

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***Abstract.* *Dracaena marginata* Lam., grown continuously in full sun, produced an average of 4.3 basal branches per plant, while plants grown under 50% shade produced no basal branches. Acclimatized plants with a maximum number of shoots can be produced in 20-liter containers in 12 months by growing in full sun for 9 months to induce basal branching followed by 3 months in 50% shade for acclimatization.**

Dracaena marginata is grown in large quantities as an interiorscape plant by the foliage plant industry. Since flowering rarely occurs, all commercial propagation is vegetative. Container production of large plants has traditionally involved planting 3 or more rooted terminal cuttings in a large container and growing them under reduced irradiance for 12–18 months. The rooted cuttings often represent the greatest production cost of the plants, while the final value of the finished product depends on the number of canes per pot. Preliminary work indicated a difference in the growth habit of *D. marginata* grown in full sun vs. 50% shade. Basal branching rarely occurred in shade-grown

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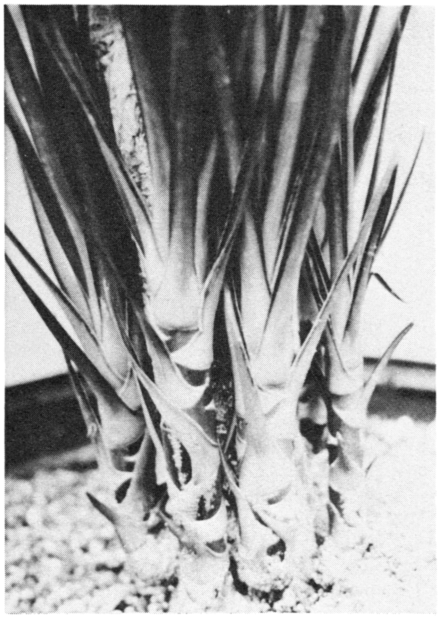

Fig. 1. Basal branching of *D. marginata* after 6 months of full sun.

plants, while those grown in full sun tended to produce basal shoots originating beneath the soil surface (Fig. 1). The process of basal brancing is not fully understood. The basal branches are not homologous to those of *Cordyline* sp., where vertical descending rhizomes give rise to basal branches (5), but rather seem to arise from dormant axillary buds on the buried portion of the original cutting. The mechanism by which this bud dormancy is broken is not known, but increased translocation of photosynthates in sun-grown plants may be implicated.

Table 1. Branching response of *D. marginata* exposed to full sun for varying lengths of time.

Treatment duration (mo.)		No.
Full sun	50% shade	basal branches
0	12	0[z]
1	11	0.1
2	10	0.2
3	9	0.4
4	8	0.8
5	7	1.3
6	6	1.9
7	5	2.6
8	4	3.0
9	3	4.2
10	2	4.3
11	1	4.3

[z]Regression significant at 0.1% level.

Chemical treatments with cytokinins have been unpredictable or ineffective in inducing branching in *D. marginata*. Branching that does occur is terminal rather than basal, similar to that reported on anthuriums (4) and poinsettias (2). Mechanical removal of the apical meristem produces similar terminal branching. Basally branched plants are more aesthetically desirable than terminally branched plants because they are more balanced and compact.

Shade production of *D. marginata* improves the appearance of the finished plant and better acclimates it to lower interior light levels. A 40% shade (720 μE m^{-2}sec^{-1}) level was found to acclimate the plants as well as higher shade levels (3). Most commercial producers grow dracaenas under 55–70% shade (540–360 μE m^{-2}sec^{-1}). An experiment was designed to combine the tendency for basal branching under full sun production with the benefit of shade acclimatization of the finished crop.

Shade-grown *D. marginata* terminal cuttings were rooted in perlite under intermittent mist. On Jan. 28, 1979, the rooted cuttings were planted in a mix containing cypress shavings, coarse sand, and Florida peat (1:1:1, by volume) with 1 rooted cutting per 20-liter container. Each plant was fertilized initially with 40g of Osmocote 18N–3P–10K (Sierra Chemical Co., Milpitas, Calif.) and at 4-month intervals thereafter. All plants were also sprayed with STEM[2] (a micronutrient fertilizer mix manufactured by W. R. Grace & Co., Allentown, Penn.) on July 29 and Oct. 1, 1979.

Ten plants were initially placed under 50% polypropylene shadecloth and 110 were placed in full sun. Mean monthly irradiance ranged from a minimum of 677 μE m^{-2}s^{-1} in December to a maximum of 1252 μE m^{-2}s^{-1} in April (1). Each month, for a period of 1 year, 10 additional plants were moved from full sun to 50% shade. At the end of the year, plants were evaluated for quality and basal branching.

[2]The use of trade names does not imply endorsement of that product by the University of Florida over materials containing equivalent ingredients.

Plants grown for 12 months under 50% shade showed no basal branching (Table 1). Plants grown for 5–9 months in full sun and then moved to 50% shade for acclimatization showed an increase in the number of shoots produced as time in full sun was increased. Optimum basal branching occurred in plants grown in full sun for 9 months. Additional exposure to full sun did not significantly increase branching. The branching response of *D. marginata* to full sun over time can be described by the regression equation:

$$B = 0.57 - 0.6T + 17T^2,$$

where B is the number of basal branches and T is the number of months in full sun ($R^2 = 0.84$).

Once initiated, basal branches of *D. marginata* developed rapidly and within 4 months were comparable in size to the original shoot. Irradiance following shoot initiation did not affect rate of development of basal branches. Thus, it is possible to produce acclimatized *D. marginata* with an average of 5 stems per 20-liter container in 12 months from a single rooted cutting in south Florida. Nine months are required for optimum basal branch induction and 3 for acclimatization of the plants to lower irradiances. Use of this production technique can substantially reduce the initial cost, while still producing quality plants that sell for prices equal to or greater than those produced by standard methods.

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