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Effect of Nutrition, Soil Water Content, and Duration of Storage on Quality of *Dieffenbachia maculata* (Lodd.) G. Don 'Rudolph Roehrs'[1]

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Abstract. ***Dieffenbachia*** **'Rudolph Roehrs' plants were fertilized at 80, 160, and 240 mg/15-cm pot nitrogen and 80 and 240 mg/15-cm pot potassium every 2 weeks for 5 months, and placed in dark storage for 1, 2, and 3 weeks. Fertilization level did not affect development of leaf senescence or chlorosis during storage, but duration of storage did affect plant quality. Watering plants 24 hours prior to storing, or 10 days before storing, led to a difference in water usage by plants but did not affect storability. The main effect on quality reduction was duration of the dark period.**

Previous reseach on 3 foliage plants (1, 2, 3) showed the importance of fertilizer and watering levels on subsequent acclimatization to interior conditions. These production factors also might influence plants' capabilities to adapt to periods of dark storage during shipping. Poole and Conover (5) found high light and fertilizer levels during production of *Ficus benjamina* L. increased leaf drop after dark storage, and suggested lack of water during storage might have been a limiting factor. Peterson et al. (4) showed water stress caused leaf drop in *F. benjamina*. Poole and Conover (5) noted lower leaves of *Dieffenbachia* became chlorotic when plants were held at 25°C for 9 days in the dark, but not after 6 days.

Experiment 1. This 3 × 2 × 4 factorial experiment consisted of 3 levels of N (80, 160, and 240 mg/pot for 2 weeks), 2 levels of K (80 and 240 mg/pot for 2 weeks), and 4 durations of dark storage (0, 1, 2, and 3 weeks). Pathogen-free *Dieffenbachia maculata* (Lodd.) G. Don 'Rudolph Roehrs' rooted cuttings about 30-cm tall from tissue-cultured stock plants were placed May 1, 1980, in 15-cm plastic pots containing a 2:1:1 (v/v/v) mix of Florida peat, pine bark, and cypress shavings amended with 0.6 kg/m^3 Perk (a micronutrient blend manufactured by Estech General Chemical Corp., Chicago, Ill.) and 3 kg/m^3 dolomitic lime. Phosphorus from single superphosphate (SSP), supplied at 1.5 kg/m^3, was incorporated into the soil mix. Plants were grown in a greenhouse with temperatures of 18° to 40°C and light intensity of 250 μE m^{-2}sec^{-1} maximum (about 85% shade). Watering was done twice a week, and fertilizers were supplied in liquid form every 2 weeks. There were 3 replications with 1 plant as an experimental unit. On Sept. 30, 1980, plants were paper-sleeved and placed 12 to a shipping carton (58.4 × 45.7 × 91.4 cm). The ventless cartons were sealed and placed in a controlled-temperature room. Temperature inside cartons was 17±1°, and the relative humidity (RH) was 80±10%. Control plants (0 storage) were moved from the greenhouse to growth rooms (GR) when storage treatments started. Temperature in the GR was maintained at 27±1°, and the RH at 50±10%. Plants were lighted 12 hr per day by Cool White fluorescent lamps at 15 μE m^{-2}sec^{-1} intensity, measured at plant tops. Plants in GR were watered once a week, while plants in cartons were watered 1 day before storage and upon removal. Stored plants were moved to the GR and then watered similarly to GR plants. Evaluation was done 4 weeks after first plants were removed from storage by measuring plant height and color grade of the lowest 7 leaves, according to a 1 to 5 scale (1 = dead or yellow leaf, no chlorophyll; 3 = partially yellow, but salable; 5 = excellent, normal color). Increasing the N or K level increased plant height but had no effect on leaf color or number of dead leaves after the storage period (Table 1). This may

Table 1. The effect of nitrogen and potassium fertilization and duration of dark storage on leaf color, deterioration of lower leaves, and plant height of *Dieffenbachia maculata* 'Rudolph Roehrs' (Expt. 1).

Main effects	Color[z] (1–5)	Dead leaves	Height (cm)
N (mg/15-cm pot-2 wk)			
80	4.2 a[y]	1.5 a	60 a
160	4.3 a	1.2 a	67 b
240	4.3 a	1.3 a	66 b
K (mg/15-cm pot-2 wk)			
80	4.2 a	1.4 a	63 a
240	4.4 a	1.2 a	66 b
Dark storage (wk)			
0	4.5 a	0.8 a	63 b
1	4.5 a	0.8 a	54 a
2	4.1 b	1.6 ab	66 b
3	3.9 b	2.0 b	64 b

[z]Mean color grade (1 = dead, yellow leaf, no chlorophyll; 3 = partially yellow, but salable; 5 = excellent, normal color) of 7 lowest leaves.
[y]Mean separation in column within experimental groups by Duncan's multiple range test, 5% level.

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Table 2. The effect of time of watering before storage and length of dark storage on water used during storage of *Dieffenbachia maculata* 'Rudolph Roehrs' (Expt. 2).

Main effects	Water used during storage (ml/pot)	(ml/pot-day)
Time of watering before storage (days)		
1	365 b	---
5	284 a	---
10	250 a	---
Storage time (days)		
10	200 a[z]	20
20	323 b	16
30	374 c	12

[z]Mean separation in column within experimental group by Duncan's multiple range test, 5% level.

have been due to the fact that rates used were only slightly more than twice the recommended level of 110 mg/15-cm pot for 2 weeks (1200 kg/ha-yr) and use of liquid fertilizer combined with leaching prevented any salts buildup. Storage of plants for 2 or 3 weeks reduced leaf color and increased the number of dead leaves, but had no effect on plant height.

Experiment 2. On Nov. 20, 1980, dieffenbachia about 64 cm in height from experiment 1 were repotted into 20-cm plastic pots using the same soil mixture that was used in that experiment, but amended with 1 kg/m^3 Perk and 4 kg/m^3 dolomitic lime. After planting, 8 g of 14–6–12 (N-P-K) Osmocote (equivalent to 1200 kg N/ha-yr) was added to each pot. For 2 months, plants were placed in the same growing environment that was used in experiment 1. Experiment 2 was a 3 × 4 factorial with 5 replications of 1 plant as the experimental unit. Plants were watered 10, 5, or 1 days before storage and were dark-stored for 0, 10, 20, or 30 days. Amount of water in pots was calculated by weighing the pots 1 hr after watering, before placing in storage, and immediatly after removing from storage. Percent water-holding capacity (WHC) was determined by weighing undisturbed root ball 1 hr after watering and again after it had been dried completly in a 65°C oven. Data collected included the number of dead bottom leaves, dry weight of these leaves, height to first normal green leaf, and average color grade for the lower 7 leaves.

Table 3. Effect of time of watering before storage and length of dark storage on quality of *Dieffenbachia maculata* 'Rudolph Roehrs' (Expt. 2).

Main effects	Color[z] (1–5)	No. of dead leaves/plant	Ht. to 1st normal leaf (cm)
Time of watering before storage (days)			
1	3.8 a	2.5 a	17.7 a
5	3.7 a	2.4 a	15.1 a
10	3.5 a	2.7 a	14.6 a
Dark storage time (days)			
0	4.9 a[y]	0.1 a	5.0 a
10	4.5 a	0.8 a	7.0 a
20	3.5 b	2.6 b	13.3 b
30	1.7 c	6.5 c	22.1 c

[z]Mean color grade (1 = dead, yellow leaf, no chlorophyll; 3 = partially yellow, but salable; 5 = excellent, normal color) of 7 lowest leaves.
[y]Mean separation in column within experimental groups by Duncan's multiple range test, 5% level.

Time of watering before storage affected the amount of water present in the soil at the beginning of dark-storage period. The 2800 ml of growth medium (in the 20-cm pot) when watered 1, 5, and 10 days prior to storage contained, when placed in storage, 1991, 1804, and 1553 ml of water, or 71, 64, and 56% by volume, respectively. The amount of water used by each plant during storage was dependent on the initial water content and on the length of the storage period. Plants which were watered just before storage had more available water and used more water (Table 2). The longer the storage period, the greater the amount of water used. The average amount of water used daily by the plants was inversely correlated to the length of the storage period.

The length of the storage period was the main factor affecting quality of the plants after storage (Table 3). The longer the dark storage, the lower the leaf color grade, the more dead leaves per plant, and the greater the increase in plant stem height to first normal leaf. Ten days of storage did not cause any overall reduction in plant appearance, while 20 days of storage caused deterioration. After 30 days of storage, severe deterioration was evident and plants were unsalable. Deterioration was expressed mainly in yellowing leaves starting from the lowest leaf. Time of watering before storage did not significantly affect quality of plants.

Fertility level and time of watering before storage did not have significant effects on storability of *Dieffenbachia maculata* 'Rudolph Roehrs' in these experiments. This indicates that production factors may be less exacting for *Dieffenbachia* than for some genera previously tested. These data do indicate, however, that long-term shipping (3 to 4 weeks) will not be possible unless factors responsible for leaf-yellowing can be eliminated and shipping procedures can be altered.

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Postharvest Effects of Ancymidol on *Ficus benjamina* L.[1]

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Additional index words. acclimatization, foliage plant, growth regulator, light

***Abstract. Ficus benjamina* were treated with ancymidol [α-cyclopropyl-α- (p-methoxyphenyl)-5-pyrimidine methanol] as a soil drench using 1.0 mg/15-cm pot plus 200 ppm spray. Plants were exposed to dark storage treatments (0, 4, 8, and 12 days) in shipping boxes before being held 4 months in a simulated interior environment (SIE) under 15 μE m^{-2}s^{-1} photosynthetically active radiation (PAR) from incandescent (INC) lamps or Cool White fluorescent (CWF) lamps. Leaf drop was less for ancymidol-treated plants for all dark storage periods in comparison to untreated plants. In addition, leaf drop was less on plants held in SIE 4 months under INC lamps. Ancymidol-treated plants had better plant grade for all dark storge periods than untreated plants when held under both lamp sources and were superior under INC lamps.**

Foliage plants frequently are displayed in retail shops under low light levels after dark-storage shipment. Plants held for extended periods under insufficient light levels develop an etiolated or spindly appearance from excessively long internodes, exhibit foliar yellowing, and lose lower leaves. Poole and Conover (10) showed light and fertilizer levels to be important conditioning factors for postharvest handling in simulated dark-storage shipment. They reported that *F. benjamina* grown under low light (60% shade) and with low fertilizer (80 mg N/pot·week)

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