Table 4. Influence of production light and fertilizer levels on elemental composition of *Pittosporum tobira* 'Variegata' after 5 years production.

Treatments	% dry weight					parts per million			
	N	P	K	Ca	Mg	Cu	Fe	Mn	Zn
Light intensity (% shade)									
30	1.60	0.17	0.84	0.58	0.29	6	101	162	159
47	1.36	0.19	0.82	1.74	0.30	7	143	606	242
63	1.41	0.17	1.24	1.08	0.34	7	112	188	199
Significant effects[z]:									
linear	*	NS	**	**	NS	NS	*	NS	NS
quadratic	NS	NS	*	NS	NS	NS	**	**	**
Fertilizer levels[y] (kgN/ha/yr)									
160	1.44	0.16	0.68	1.18	0.35	7	116	206	184
320	1.46	0.17	0.88	1.14	0.32	6	121	322	214
480	1.42	0.17	1.35	0.82	0.27	6	116	440	173
640	1.50	0.20	1.10	1.13	0.30	7	120	308	229
Significant effects[z]:									
linear	NS	NS	**	NS	**	NS	**	**	NS
quadratic	NS	NS	NS	NS	*	NS	NS	**	NS

[z]NS=not significant, *=significant at 5% level and **=significant at 1% level.
[y]kg N/ha/yr from a 6N — 2.6 P — 5 K fertilizer source. Each plot received 100, 200, 300 or 400 g/mo.

Based on the data presented, greatest yields for both green and variegated pittosporum appear to be obtained under 47% shadecloth at a fertilizer level of 160 kg N/ha/year from a 6 N — 2.6 P — 5 K fertilizer. An average yield potential for both green and variegated pittosporum production of 9 kg/4.5 m²/year (20,000 kg/ha/year) is possible if the entire area is planted. This is equivalent to 18,000 lbs/A/year. Woody foliage is sold by the bunch which weighs about 1 pound (0.45 kg). As of spring 1980, green pittosporum sold for $1.10 and variegated $1.40 per bunch. This is equivalent to gross sales of $19,800 for green and $25,200 for variegated per year if the entire area is planted. If the yield is decreased 20% for inclusion of roads and other work areas, the potential is still excellent.

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THE EFFECT OF CHILLING ON SUBSEQUENT ROOTING OF AGLAONEMA 'SILVER QUEEN' TIP CUTTINGS

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Abstract. **Unrooted tip cuttings of Aglaonema 'Silver Queen' packed to simulate shipping conditions and intact containerized plants were exposed to a temperature of 7°C (43.6°F) ± 1°C (1.8°F) for 6 days. Tip cuttings were then removed from packing and taken from intact plants and propagated under intermittent mist for 8 weeks. Measurements of root length and spread showed a decrease in root system size on chilled tip cuttings which had been packed compared to tip cuttings which came from chilled intact and unchilled intact plants. The number of roots initiated was not significantly affected although extensiveness of root systems was altered by chilling.**

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Many foliage plants grown for interior decorative purposes originated in tropical climates and are often subject to injury when exposed to temperatures between 0°C (32°F) and 10°C (50°F) (1, 2, 4, 6). Injury occurring within this range has been defined as chilling injury (3). Temperatures capable of producing chilling injury may occur during the shipping of plants or plants parts from tropical foliage production centers to subtropical finishing areas. Growers have indicated that *Aglaonema* spp. are susceptible to chill injury (5). This experiment was conducted to determine the effect of chilling on propagation of *Aglaonema* 'Silver Queen' tip cuttings.

Materials and Methods

Uniform *Aglaonema* tip cuttings and intact container plants were selected on February 12, 1980. Prior to the experiment they were grown in a greenhouse with ambient temperatures ranging from 15.5°C (60°F) minimum night temperature to 33.3°C (92°F) maximum day temperature.

Table 1. Influence of storage time, temperature, and stock plant chilling on *Aglaonema* 'Silver Queen' tip cuttings propagated for 8 weeks.

Days stock plants chilled prior to cutting removal	Days cuttings stored prior to sticking		Root spread	Length longest root	
temperature regime	temperautre regime		(cm)	(cm)	Total number roots
7°C	7°C	>10°C			
0	—	—	6.7a	3.0a	10.7a
6	—	—	5.9ab	2.6ab	9.8a
—	0	6	4.9bc	2.2bc	8.2a
—	6	0	4.0c	1.7c	7.4a

Tip cuttings having 4 leaves and 2 bare nodes were dipped in a 100 ppm streptomycin solution and the base of the cutting wrapped in moist sphagnum moss and secured with aluminum foil. Six tip cuttings were rolled together in brown wrapping paper and placed in a cardboard box. Each treatment was replicated 4 times with each box an experimental unit. Four boxes were placed under a greenhouse bench where ambient temperatures were 15.5°C (60°F) minimum night and 33.3°C (92°F) maximum day temperature. Another 4 boxes were placed in a walk-in refrigerated chamber maintained at 7°C (43.6°F) ± 1°C (1.8°F). Simultaneously, 24 intact container plants were placed in the same walk-in refrigerated chamber, and 24 remained in the greenhouse.

Boxed tip cuttings were unpacked after 6 days. A single tip cutting was removed from each intact plant in the walk-in refrigerated chamber and single tip cuttings were removed from each of 24 container grown plants which had remained in the greenhouse. All cuttings were arranged in a completely randomized block design with 6 cuttings per experimental unit, and propagated in a 1:1 peat:perlite (vol/vol) mix under intermittent mist (5 sec/30 min, 12 hr/day). After 2 months, cuttings were lifted, rinsed, and number of roots, length of longest root, and maximum spread were taken.

Results and Discussion

The chilling temperature used was chosen because studies with *Fittonia* and *Dieffenbachia* (2, 4) indicated it was sufficient to induce a chilling response without extensive foliar damage. However, chilling injury in the form of foliar damage was observed on several chilled tip cuttings and chilled intact plants. Damaged leaf sections were taken from chilled cuttings and leaves from unchilled ones, killed in FAA, sectioned to 10 microns thickness and stained in toluidine blue. Damage response to chilling appeared macroscopically as dark greasy patches varying in size and shape from 1 to 4 cm in diameter. Microscopically, the upper epidermis of the damaged leaves showed signs of collapse and slight depressions were associated with areas of more severe collapse (Fig. 1).

Measurements of root length and spread showed a less extensive root system on chilled tip cuttings that were stored as compared to tip cuttings from chilled and unchilled intact plants. Chilling reduced root length and total spread, but total numbers of roots initiated was not affected (Table 1), indicating that chilling might not influence adventitious root formation but could affect subsequent root growth and developments.

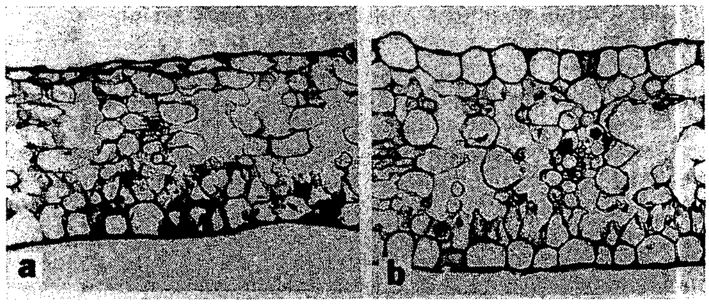

Fig. 1. Epidermal collapse produced by chilling at 7°C (43.6°) for 6 days on *Aglaonema* 'Silver Queen' (A), as compared to unchilled leaf section (B) X91.3.

Storage of cuttings also influenced root extensiveness. Tip cuttings from unchilled stored treatment had less extensive root systems than those from unchilled intact plants. The same comparison holds true between chilled stored tip cuttings and tip cuttings from chilled intact plants.

These data indicate that *Aglaonema* 'Silver Queen' tip cuttings might be of better quality if storage time is less than 6 days and especially if chilling temperatures are avoided prior to propagation.

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