Influence of the Timing of Propagation and Cold Storage on the Growth and Development of *Alstroemeria* Pot Plants©

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INTRODUCTION

Alstroemeria, also known as the lily-of-the-Incas or Inca lily, is a herbaceous plant which produces vegetative and floral shoots from an underground rhizome (Bridgen, 1997). Native to South America, this monocotyledonous plant belongs to the family Alstroemeriaceae. Approximately 30 of the species are endemic to Chile, 13 from Brazil, 4 from Argentina and 3 from Peru (Bayer, 1987).

Among cut flower producers *Alstroemeria* is a favorite, due to its long vase life, long period of flowering, preference for cool temperatures and high yield of flowers. There are several multiplication systems available for *Alstroemeria*: rhizome division, micropropagation, and seed propagation. Commercial cultivars are possible to group under one of three general classifications: butterfly-, orchid-, and hybrid-type cultivars. The butterfly-type is a group that will flower for nine to 12 months each year depending upon the cultivar and environmental conditions. These cultivars have shorter growth habits and larger, more open flowers than the orchid-type. The orchid-type of *Alstroemeria* is a group that has three to five months of major flower production in the spring with little or no flowering during the remainder of the year. These cultivars have tall growth habits, remain vegetative until spring, produce a large number of flowers in a short period and are most often used for commercial cut flower production. The hybrid-type cultivars contain characteristics from both of the two other types.

During recent years, there has been greater interest in *Alstroemeria* for uses other than for its cut flowers; these include growing plants as garden flowers (perennials or annuals) and as flowering potted plants (Bridgen, 1992). There is an increasing interest for growing *Alstroemeria* as a flowering pot plant not only in the U.S.A., but also in Europe and Japan. Most of the cultivars used for this purpose are butterfly-types.

Potted plants offer new alternatives for growers who are trying to diversify and find new products for a demanding market. This new production alternative also brings new challenges and problems. Because rhizome division is the most commonly used propagation system, the timing of propagation, utilization of labor, efficient use of greenhouse bench space, and cold storage of rhizomes are important problems that the growers may have when producing *Alstroemeria* as a potted crop. Cold storage is not an environmental requirement for growing *Alstroemeria*. Cold storage is used to adjust greenhouse scheduling during busy times of the year (October to February).

The objective of this study was to evaluate the effect of different dates of propagation and cold storage periods on the growth and flowering of *Alstroemeria* potted plants.

Table 1. Environmental treatments for the propagation of *Alstroemeria*: week of propagation, pot size and environmental management.

Week of propagation (Week #)	Pot size[1]	Weeks in warm greenhouse (20°C nights)	Cold storage (4°C) Period (weeks in cold)	Light/ darkness
39	Large	4	0	NA[2]
39	Small	4	8	Light
39	Small	4	8	Darkness
41	Large	4	6	NA
41	Small	4	6	Light
41	Small	4	6	Darkness
43	Large	4	0	NA
43	Small	4	4	Light
43	Small	4	4	Darkness
47	Large	4	0	NA
47	Small	4	0	NA

[1] Large pots = 3.8 liter; small pots = 1.4 liter.
[2] NA – not applicable.

MATERIALS AND METHODS

Two butterfly-type cultivars of *Alstroemeria*, 'Patricia Lynn' and 'FL-101', were used for this study. Plants were propagated during four different dates in 1997: weeks #39, #41, #43 and #47. They were propagated in either large (3.8 liter) or small nursery pots (1.4 liter). Following division, all plants were grown for 4 weeks in a "warm" greenhouse (20°C nights). After this period of establishment, plants in the large nursery pots were transferred directly to the final growing greenhouse (16°C nights) and plants in the small pots were refrigerated at 4°C for 8, 6, 4 or 0 weeks with either complete light or complete dark conditions. Once the cold treatment was completed, all plants were transferred on the same date to large nursery pots for finishing with those plants that had been initially propagated in large pots. All plants were cut back on week #3 of 1998 to follow commonly-used grower techniques. A detailed description of the treatments is shown in Table 1. Plants were evaluated at anthesis (determined as the time when two florets were open) for time to flowering, visual evaluation, fresh aerial weight, number and length of flowering stems, and number of florets per flowering stem.

RESULTS AND DISCUSSION

Refrigerated treatments delayed the time of flowering in 'Patricia Lynn' and 'FL-101' when compared to plants that were grown with no refrigeration (Fig. 1). This effect is due to the greater time under cold storage. Differences of time to flowering

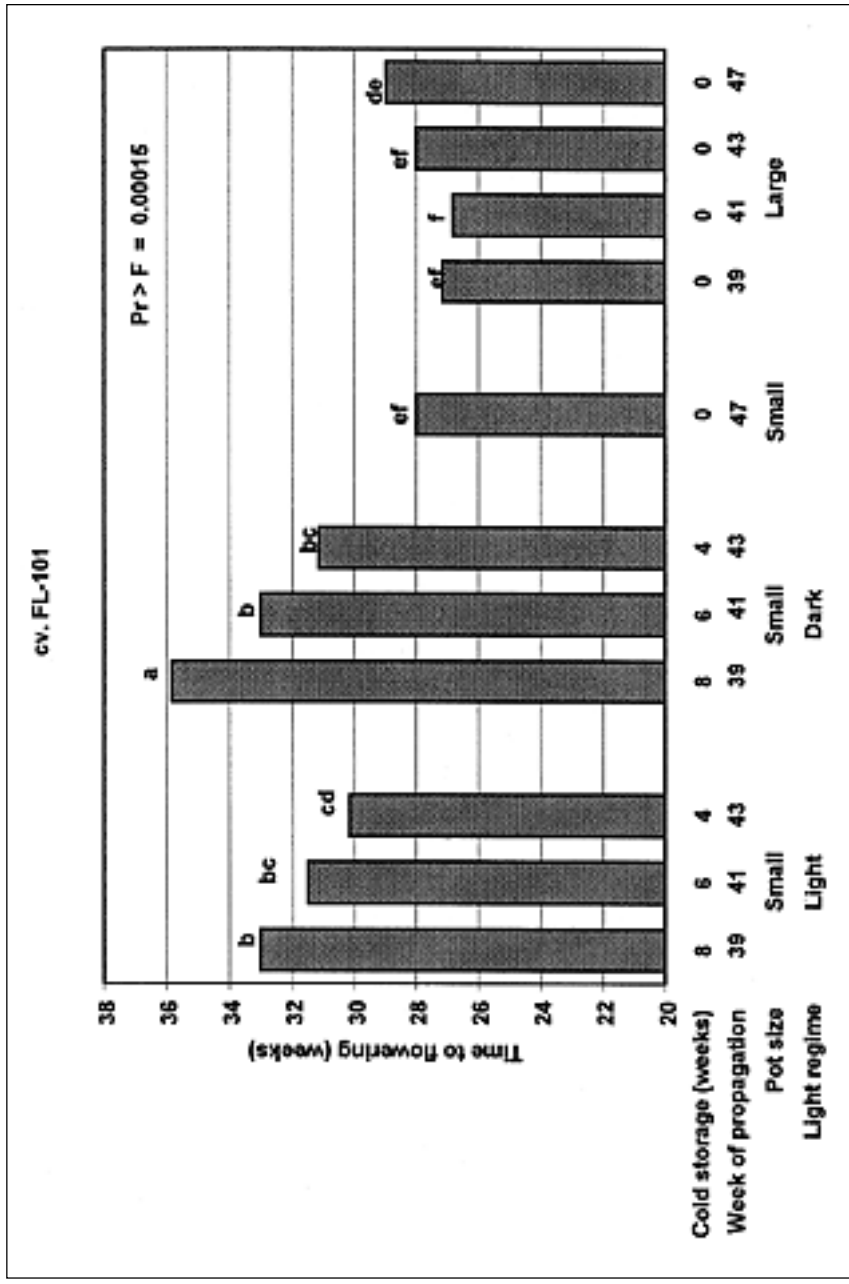

Figure 1a. Time to flowering of *Alstroemeria* cultivar 'FL-101' under different propagation stratigies.

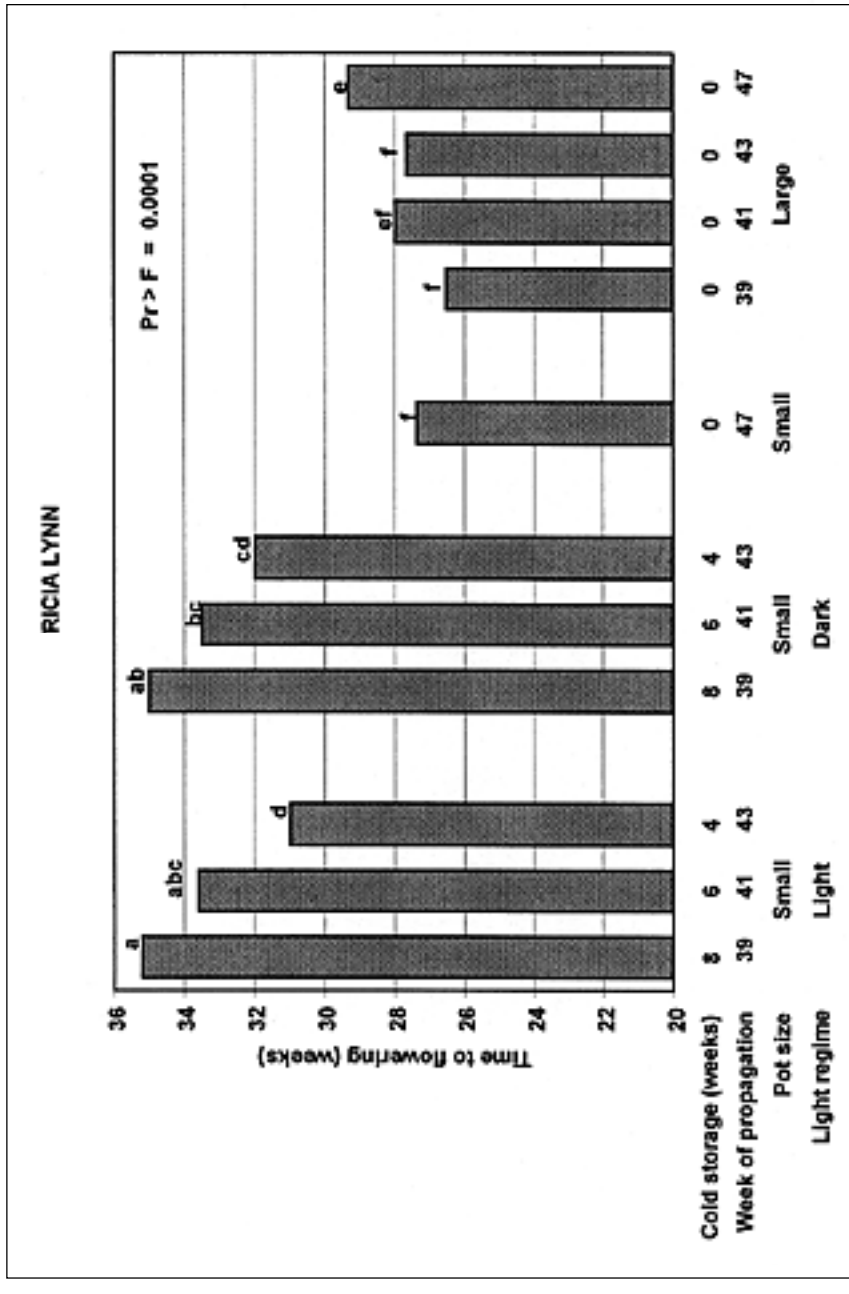

Figure 1b. Time to flowering of *Alstroemeria* 'Patricia Lynn' under different propagation stratigies.

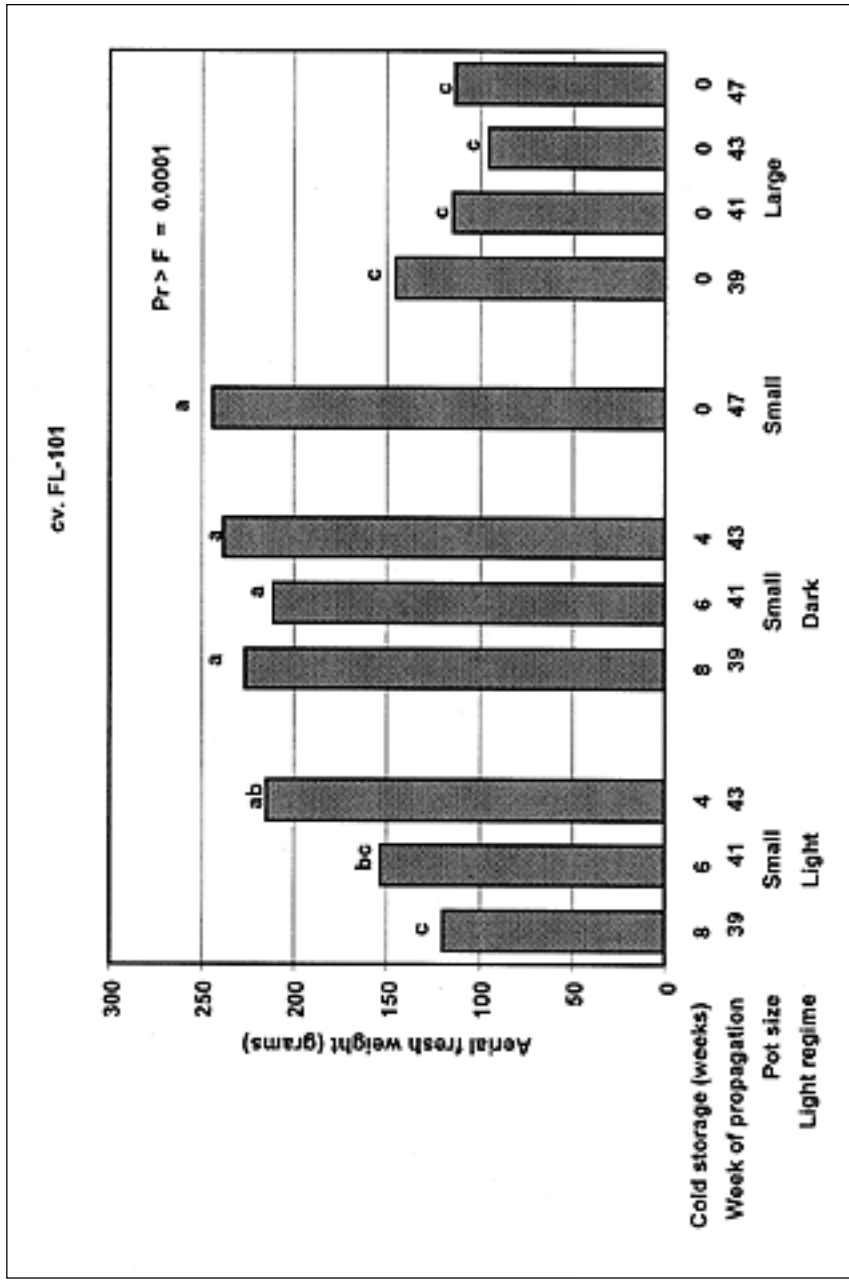

Figure 2b. Aerial fresh weight of *Alstroemeria* cultivar 'FL-101' under different propagation strategies.

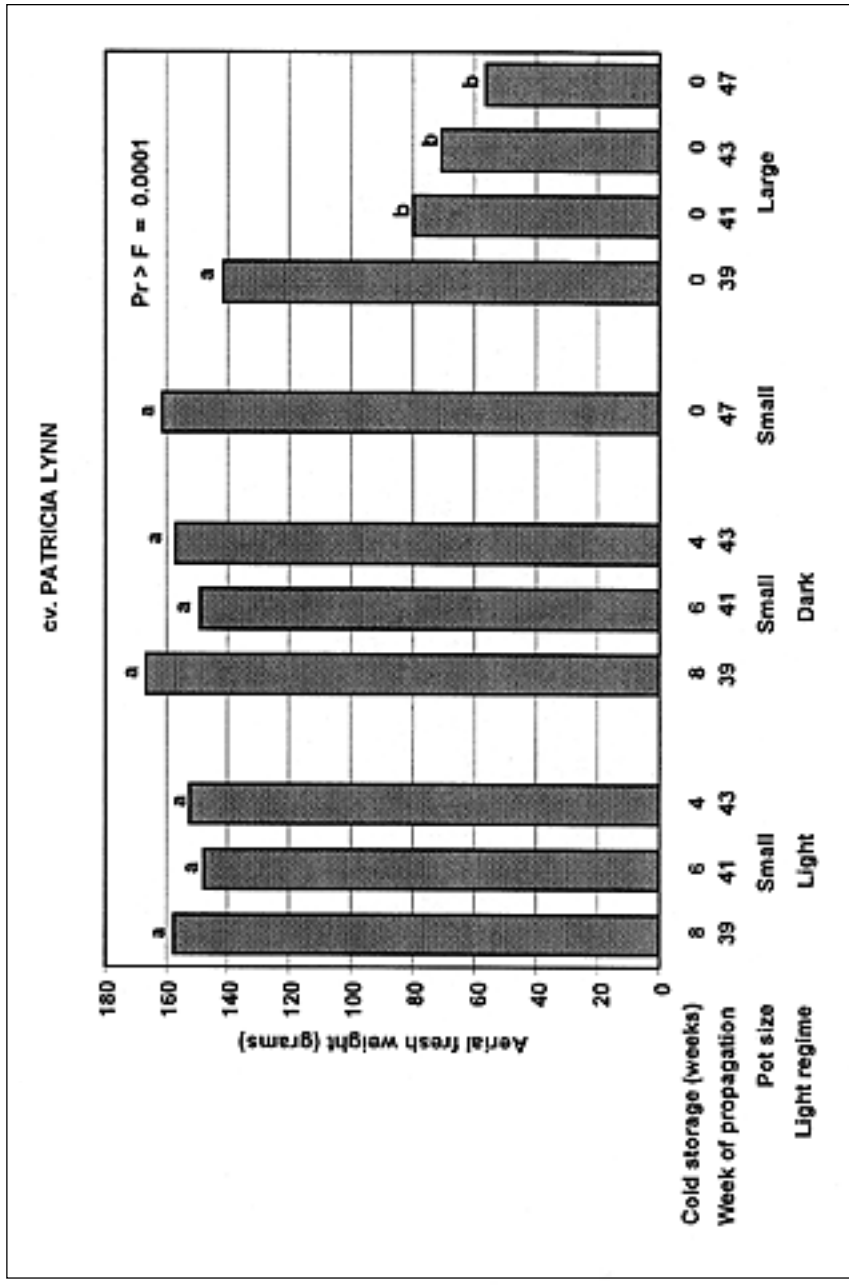

Figure 2b. Aerial fresh weight of *Alstroemeria* 'Patricia Lynn' under different propagation strategies.

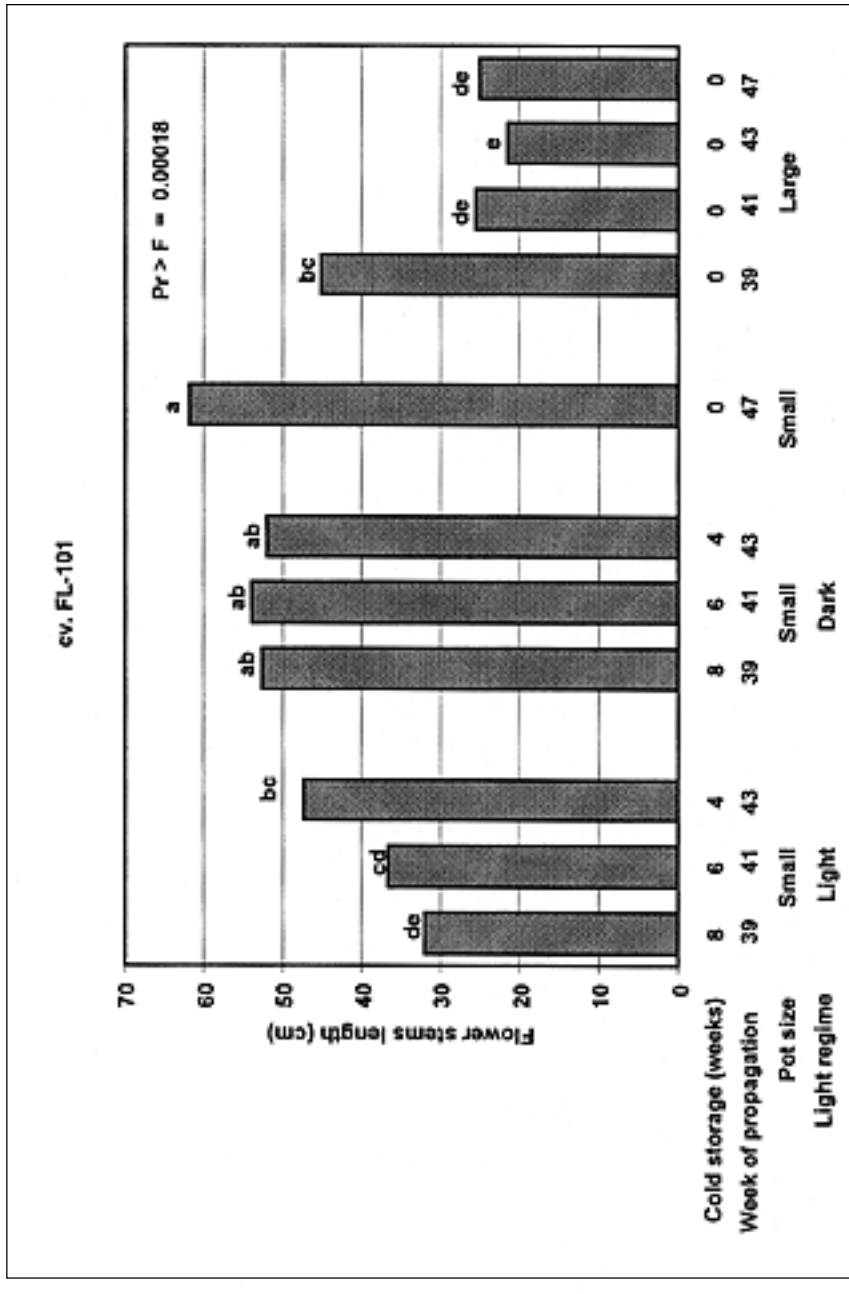

Figure 3a. Length of flowering stems of *Alstroemeria* cultivar 'FL-101' at anthesis under different propogation stratagies.

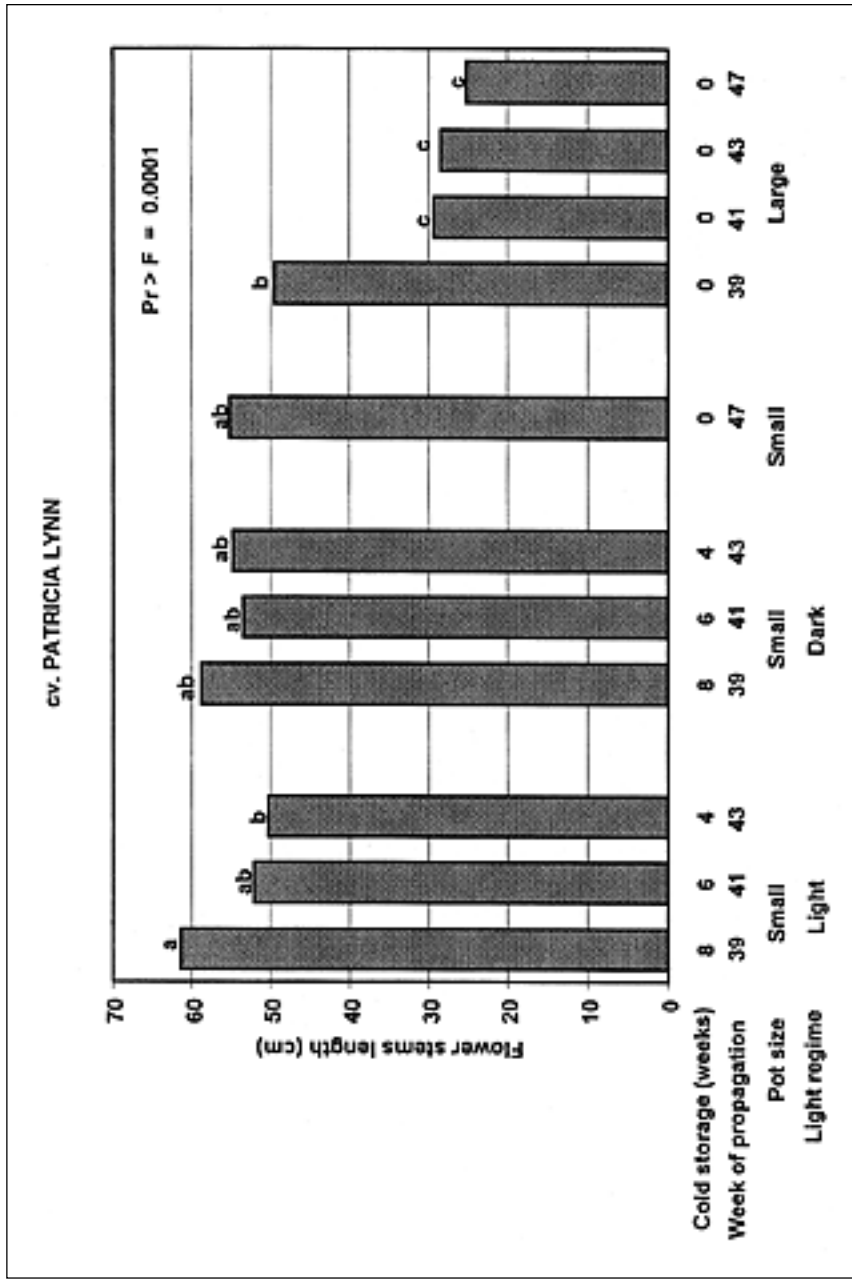

Figure 3b. Length of flowering stems of *Alstroemeria* 'Patricia Lynn' at anthesis under different propogation stratagies.

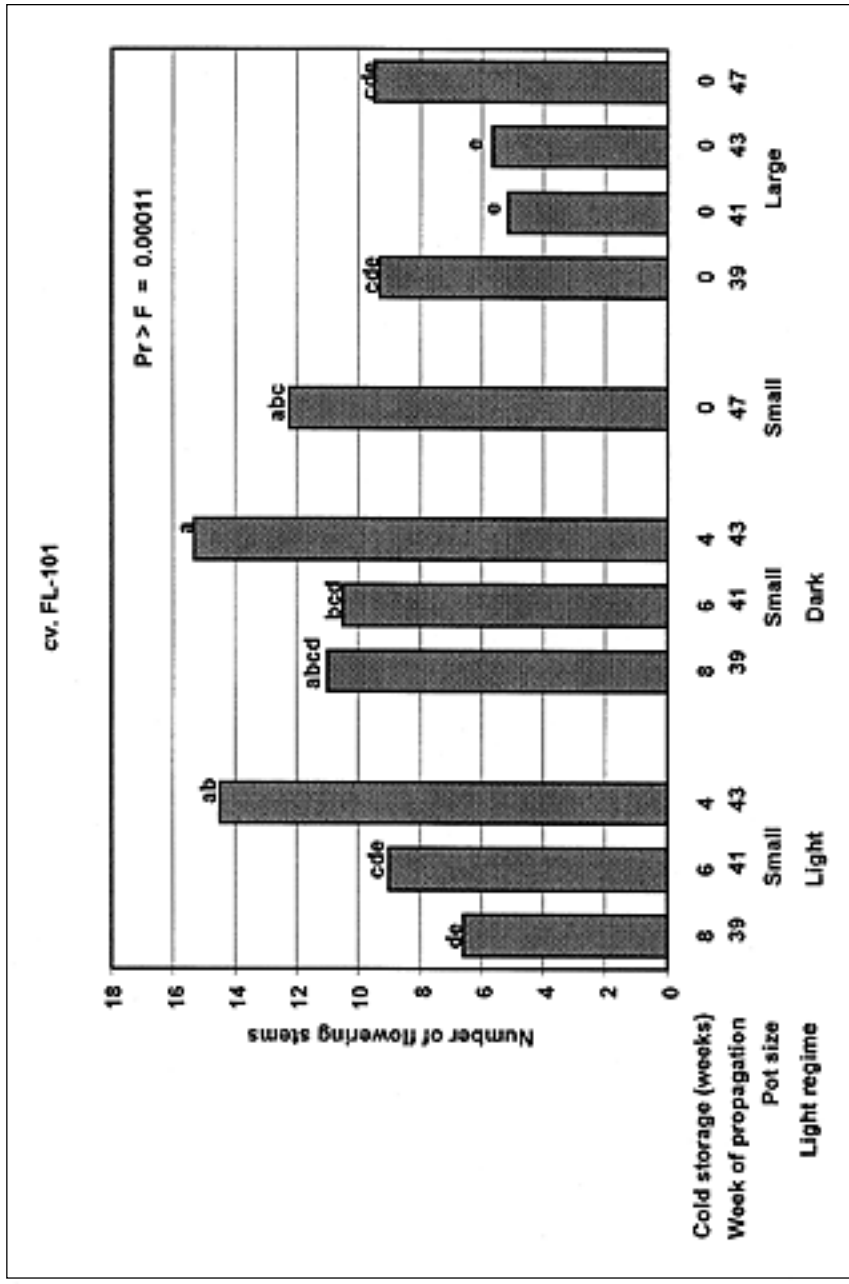

Figure 4a. Number of floral stems per plant of *Alstroemeria* cultivar 'FL-101' under different propagation stratagies.

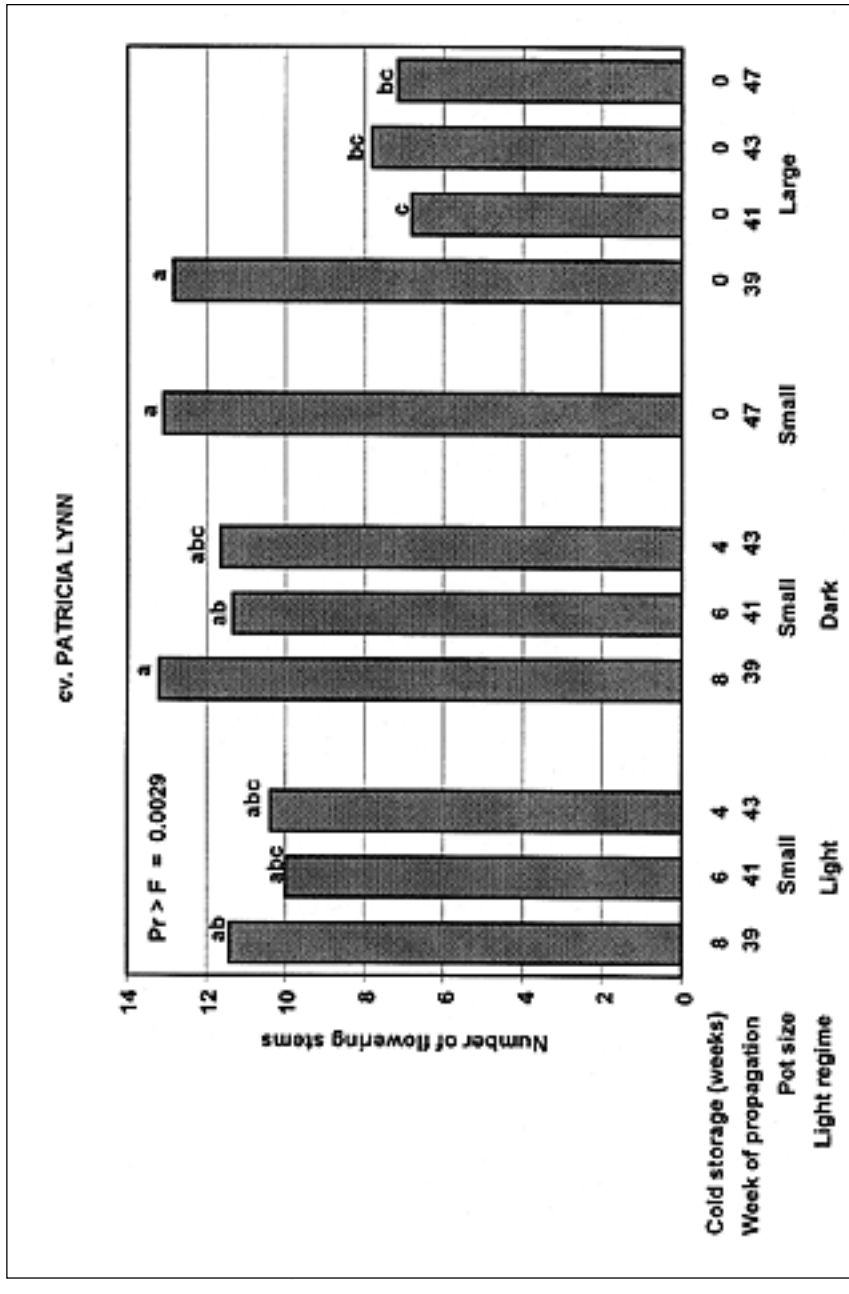

Figure 4b. Number of floral stems per plant of *Alstroemeria* 'Patricia Lynn' under different propagation stratagies.

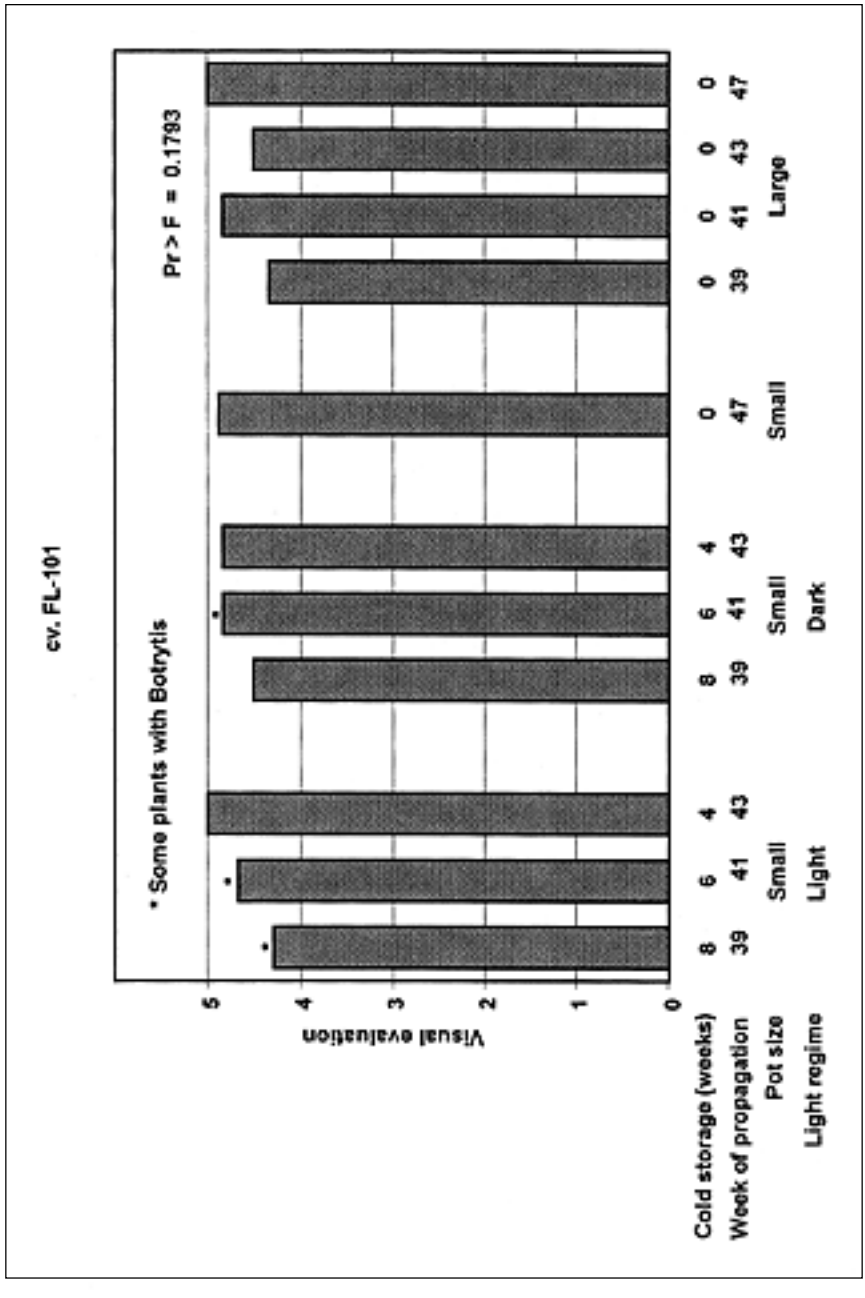

Figure 5a. Visual evaluation of plants at commercial stage (2 open florets) of *Alstroemeria* cultivar 'FL-101' under different propagation stratigies. Scale: 5 = Perfect condition; 4 = Acceptable condition; 3 = Some damage (no saleable); 2 = Very bad condition; 1 = Completely dead

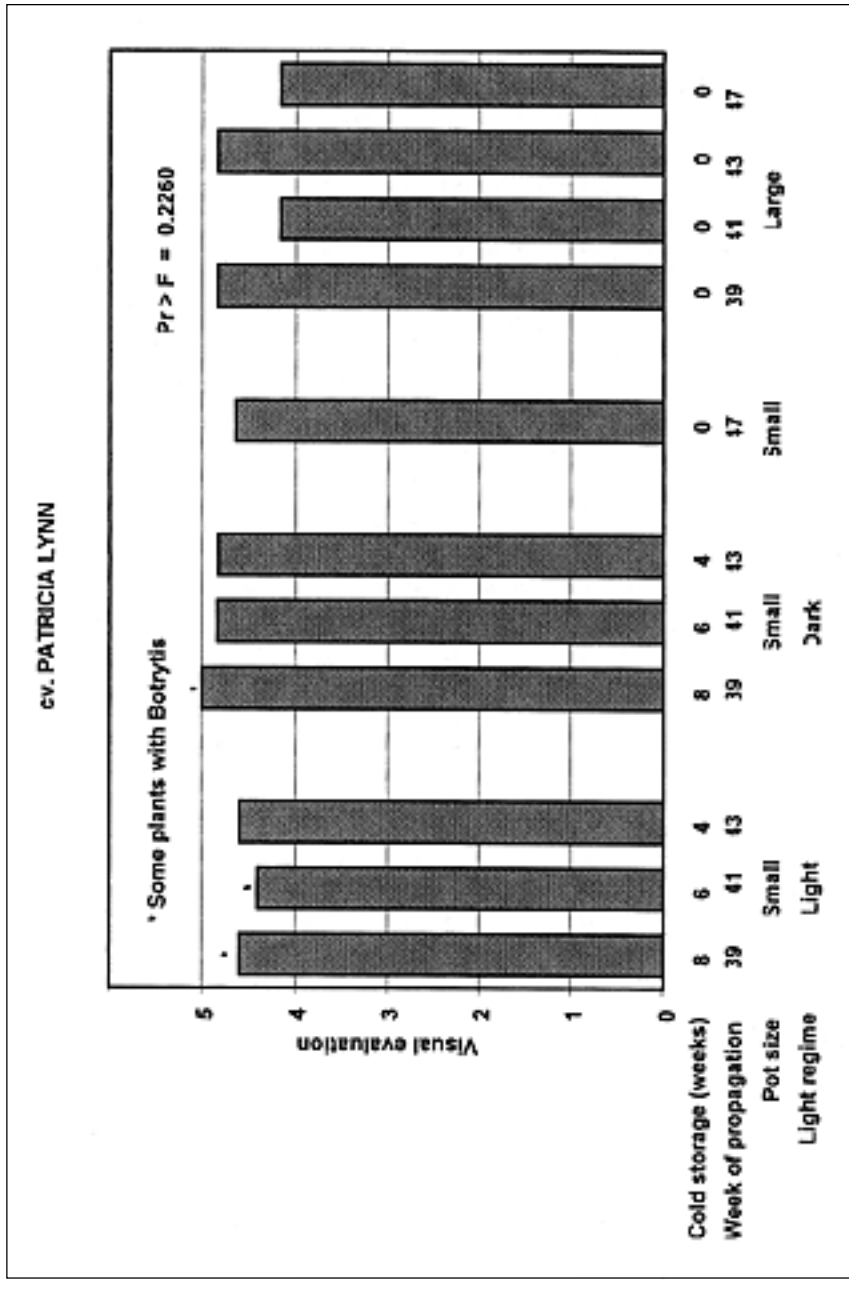

Figure 5b. Visual evaluation of plants at commercial stage (2 open florets) of *Alstroemeria* 'Patricia Lynn' under different propagation stratigies. Scale: 5 = Perfect condition; 4 = Acceptable condition; 3 = Some damage (no saleable); 2 = Very bad condition; 1 = Completely dead

between light and dark treatments were not noticed other than with 'FL-101' plants propagated in small pots on week 39.

The aerial fresh weight of plants that were not refrigerated was less than or equal to those of plants that were refrigerated (Fig. 2). There was no difference in aerial fresh weight among 'Patricia Lynn' plants propagated in small pots, neither under cold storage nor with no cold at all. Plants with no cold storage had a significant lower fresh weight, with the exception of those propagated on week 39. 'FL-101' plants show the same general tendency, but with significant differences between light and darkness treatments for the two earliest dates of propagation (Weeks 39 and 41) of small pot plants. Stem length values followed a similar tendency as aerial fresh weight (Fig. 3).

The number of flowering stems that were produced from plants that were refrigerated was either greater than or the same as plants that were not refrigerated (Fig. 4). Particular differences were observed in 'Patricia Lynn' between large and small pot plants, with a greater number of flowering stems observed in treatments with cold storage.

Overall, the presence or absence of light during refrigeration had no effect on subsequent plant growth and development. There were no differences observed among treatments for visual evaluation (Fig. 5) and the number of florets produced per inflorescence. It is important to mention that a low percentage of plants under cold storage of the earliest dates of propagation (Weeks 39 and 41) showed Botrytis attack with medium to severe damage.

This research demonstrated that *Alstroemeria* plants can be propagated early and stored under cold conditions without these procedures negatively affecting final plant performance, but the process will affect the scheduling of the crop. In addition, genotypic differences are to be expected. There is no advantage to lighting *Alstroemeria* that are stored cold.

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