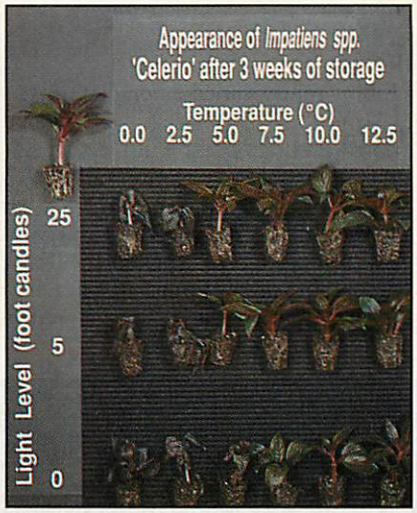


PLUG & PROPAGATION GUIDE

STORAGE

Figure 1 (far left): Appearance of New Guinea impatiens plugs immediately following 3 weeks of storage at 0-25 footcandles and 32°-54.5°F.

Figure 2 (left): Appearance of New Guinea impatiens plugs immediately following 5 weeks of storage at 0-25 footcandles and 32°-54.5°F.

How To Store New Guinea Impatiens

by ROYAL HEINS and THOMAS WALLACE JR.

WE have experimented with low-temperature storage of a variety of bedding plant plugs and have reported the results in GREENHOUSE GROWER. Our objective was to determine optimum storage conditions and durations that would not extend forcing and growing periods after transplanting.

In this article, we'll review our findings on New Guinea impatiens.

Figure 3a (top left): Appearance 2 weeks after termination of storage of New Guinea impatiens cultivars held at 45.5°F for 3 weeks. There are two rows of each cultivar per flat. Numbers represent cultivar names (see Table 1).

Figure 3b (top right): Appearance 2 weeks after termination of storage of New Guinea impatiens cultivars held at 45.5°F for 3 weeks. There are two rows of each cultivar per flat. Numbers represent cultivar names (see Table 1).

How We Did It

We conducted two separate experiments, one in '92 and one this year. The first followed the same protocol that was used in all our other plug storage experiments.

We received plug sheets (size 84) of New Guinea impatiens 'Celerio' from a commercial grower when the plugs were transplantable. The plants were kept in a glass greenhouse at 68°F for a week prior to the start of the experiment to eliminate shipping effects.

Each of 18 different temperature and light-level combinations was used to store one plug sheet. Air settings were 32°, 36.5°, 41°, 45.5°, 50°, or 54.5°F, and light from cool-white fluorescent bulbs burning constantly was kept at 0, 5, or 25 footcandles. Plug sheets were stored in darkness — or 0 footcandles — by placing them in closed cardboard shipping boxes.

All plants were subirrigated with clear water as needed during storage. Irrigation frequency varied from 3 to 20 days, depending on the temperature and humidity of the coolers.

Ten representative plants were removed from each treatment once a week for 6 weeks. One plant per treatment was photographed before all the plants were potted in 4-inch containers. The plants were forced into flower in a glass greenhouse with a minimum temperature of 68°F.

We recorded the date of first flower for each plant that survived storage, determined the average number of days from the start of forcing to first flower, and calculated percentage of plant survival for each treatment.

Storage treatments were rated as satisfactory or unsatisfactory. When no more than one of the 10 plants died after storage and flowering was not delayed more than 5 days compared to that of control plants (unstored), the treatment was classified as satisfactory.

Injury Varies By Cultivar

The second experiment was conducted because storage tests by Tom

Smith and Tom McKeegan at Four Star Greenhouses, Carleton, MI, were inconclusive. They observed that 'Celerio,' the cultivar used in our '92 experiment, performed as expected. However, many other cultivars died under storage conditions in which 'Celerio' survived. The results suggested the temperatures that caused chilling injury varied among cultivars.

To test this hypothesis, we obtained rooted cuttings of 23 cultivars in 84-cell plug sheets. 'Celerio' survived 3 weeks of dark storage at 45.5°F or warmer in the '92 experiment. Therefore, plants were exposed to 45.5°, 50°, 54.5°, and 59°F for 3 weeks.

Plants in plug sheets were stored in a shipping box, in a large plastic bag, or uncovered under 5 footcandles of cool-white fluorescent light. Seven plants of each cultivar were stored in the box and under light, while 14 were stored in the plastic bag. All were drenched with Ornalin and Dithane prior to storage.

Data presented in this article reflect the number of surviving plants 2 weeks after storage ended.

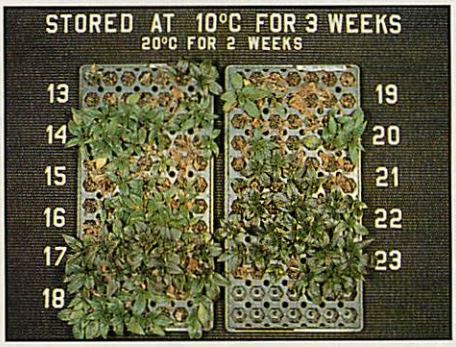


Figure 4a (top left): Appearance 2 weeks after termination of storage of New Guinea impatiens cultivars held at 50°F for 3 weeks. There are two rows of each cultivar per flat. Numbers represent cultivar names (see Table 1).

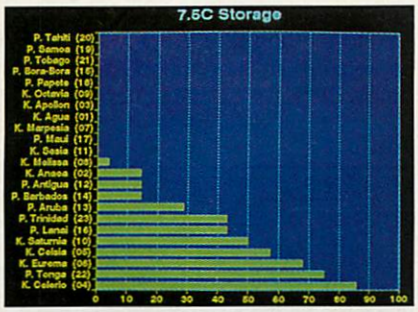
Figure 4b (top right): Appearance 2 weeks after termination of storage of New Guinea impatiens cultivars held at 50°F for 3 weeks. There are two rows of each cultivar per flat. Numbers represent cultivar names (see Table 1).

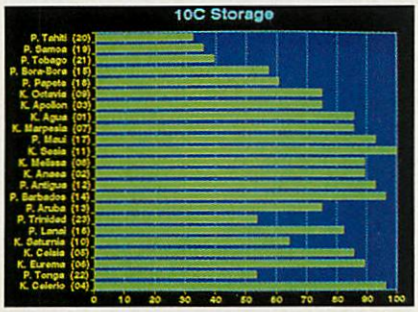
Experiment #1 Results

Chilling injury of 'Celerio' occurred at 41°F or lower (Figures 1 and 2). Plants showed damage in the form of a water-soaked appearance after 1 week of storage at 32°F in either dark or light, and all transplants died.

The temperature at which we saw chilling injury increased as storage duration increased. Neither light nor dark affected percent mortality except after 5 weeks of storage; then the presence of light reduced it at 45°F or higher. After 6 weeks of storage, plants looking best were those held at 54.5°F under 25 footcandles of light.

For plants undamaged by chilling, the time to flower after transplanting





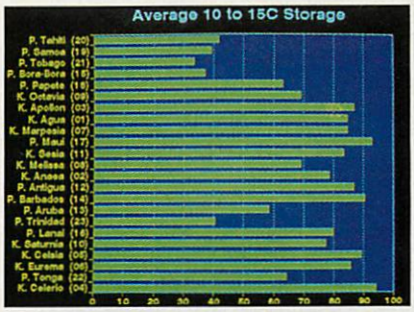


Figure 5 (top left): Percent survival of New Guinea impatiens cultivars after 3 weeks of storage at 45.5°F.

Figure 6 (left): Percent survival of New Guinea impatiens cultivars after 3 weeks of storage at 50°F.

Figure 7 (top right): Percent survival (average of three treatments at 50°, 54.5°, and 59°F) of New Guinea impatiens after 3 weeks of storage at 50°-59°F.

was unaffected by storage treatment.

Plant height did not increase significantly during storage at any temperature, even in the dark (data not shown). For plants stored 1 week, size and appearance after 6 weeks of forcing were similar to those of unstored plants. Plants held in plug sheets for 5 weeks in the greenhouse increased in size prior to transplant; therefore, these plants were larger after 6 weeks of forcing than those stored under low temperatures. Plant size and height at first flower were unaffected.

Experiment #2 Results

We observed major differences in low-temperature storage tolerance among cultivars (Figures 3a, 3b, 4a, and 4b).

Eighty-six percent of 'Celerio' plants survived dark storage at 45.5°F (Figure 5); a lower percentage of all other cultivars survived the same storage conditions. No plants from 11 cultivars survived 45.5°F dark storage for 3 weeks (Figures 3a, 3b, and 5).

Increasing storage air settings to 50°F greatly increased the percentage of plants that survived dark storage for 3 weeks (Figures 4a, 4b, and 6).

However, significant differences in tolerance to storage at 50°F still existed among cultivars; there was less than 60% survival for six cultivars. These differences were even more evident when average survival in the treatments at 50°, 54.5°, and 59°F was plotted against cultivar (Figure 7).

Plug sheets held in the dark were exposed to disease pressure from *Botrytis*. The mortality rate of certain cultivars stored above 50°F may be related to their susceptibility to *Botrytis*, not merely to cold temperatures.

These results show that most New

Guinea impatiens cultivars are sensitive to chilling injury below 50°F and some cultivars store poorly when kept below 59°F for extended periods.

Table 1

Number	Cultivar
1	Kientzler Agua
2	Kientzler Anaea
3	Kientzler Apollon
4	Kientzler Celerio
5	Kientzler Celsia
6	Kientzler Eurema
7	Kientzler Marpesia
8	Kientzler Melissa
9	Kientzler Octavia
10	Kientzler Saturnia
11	Kientzler Sesia
12	Paradise Antigua
13	Paradise Aruba
14	Paradise Barbados
15	Paradise Bora-Bora
16	Paradise Lanai
17	Paradise Maui
18	Paradise Papete
19	Paradise Samoa
20	Paradise Tahiti
21	Paradise Tobago
22	Paradise Tonga
23	Paradise Trinidad

Quality ratings were given to all surviving plants. In general, the greater the survival rate, the higher the quality.

Recommendations

With any new cultural procedure, short trials are suggested before wide-scale testing. Cold-storage and greenhouse space, and funding prevent trials of all cultivars of bedding plants tested in our ongoing plug-storage research. While we believe our results accurately reflect the response of the cultivar tested, they do not guarantee all cultivars will respond similarly.

If mixed cultivars of New Guinea impatiens must be held or stored, plants should not be held below 55°F. Most cultivars will store very well for up to 3 weeks at 54.5°F when exposed to light (Figure 7). However, be aware that some cultivars may not store well under these conditions. **GG**

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