KEEPING QUALITY OF MARIGOLDS AND IMPATIENS

Louella J. Nelson, A.M. Armitage and W.H. Carlson
Department of Horticulture
Michigan State University
East Lansing, MI 48824

Three generalizations can be made from the experimental data for both marigolds and impatiens: Plants recorded the highest FW prior to chamber storage when grown at the 70°F NT; KQ was affected more significantly by NT variation than NT duration; statistical, graphic and visual data revealed that regardless of NT treatment, KQ declined very rapidly in the 90°F chamber (Figs. 1 & 4).

MARIGOLDS: In general, there was a gradual FW loss from day one to completion of the experiment regardless of NT treatment in all KQ chambers (Fig. 1). Plants stored in both the 50 & 70°F KQ chambers maintained the highest FW when grown at the 50°F NT, reported a larger loss at the 60°F NT and an even greater loss when grown at the 70°F NT (Figs. 2 & 3). NT durations of one or two weeks retained good KQ in 50 & 70°F storage with a maximum loss of 27% FW at the three week duration.

Visually, the plants remained turgid for eighteen days and exhibited good KQ in the 50 & 70°F chambers although there was a gradual

Table 1
Marigolds — Estimated Marketable Days
(Based on 10 percent FW loss and visual data)

		Greenhouse Night Temperatures (1,2 or 3 weeks)		
		50°F	60°F	70°F
Storage Temperatures	50°F	17	14	12
	70°F	17	13	10
	90°F	4	4	4

The bedding plant industry has recently experienced rapid expansion accounting for approximately 12.5% of each dollar spent on plant sales (1). Over 60,000,000 flats were produced in 1980 with a value exceeding $240,000,000.

Although there are many growing practices used in the production of bedding plants, very little is known concerning the keeping quality (KQ) of the plant when it leaves the greenhouse. This is a first in a series of experiments carried out at Michigan State University reporting the effect of greenhouse growing conditions on the postharvest KQ of bedding plants.

High quality bedding plants can be produced within a night temperature (NT) range of 50-60°F (2). The present study was undertaken to determine the effect of NT and duration of NT on the KQ of bedding plants stored at three different postharvest temperatures. This study used fresh weight (FW) and visual changes in an attempt to measure KQ. FW measurement mirrors quality loss, visual demise, senescence and death. A 10% FW loss was the maximum acceptable loss for the plants to remain marketable.

Marigolds and impatiens were grown in VSPI soilless mix, fertilized with a constant liquid feed of 200ppm 20-20-20 and grown on at a 70°/60°F day/night temperature until three weeks prior to harvest (approximately 50% of plants in flower).

Three weeks, two weeks and one week prior to their estimated harvest date, plants were randomly selected and treated with night temperatures of 50, 60 and 70°F and a constant 70°F day temperature. FW and visual data were recorded for each treatment combination when the plants were transferred (Day 1) to controlled KQ chambers resembling retail conditions at constant temperatures of 50, 70 and 90°F. Data was continuously recorded for at least four intervals up to eighteen days for plants stored in the 50 & 70°F chambers and for up to eleven days for those stored in the 90°F chamber.

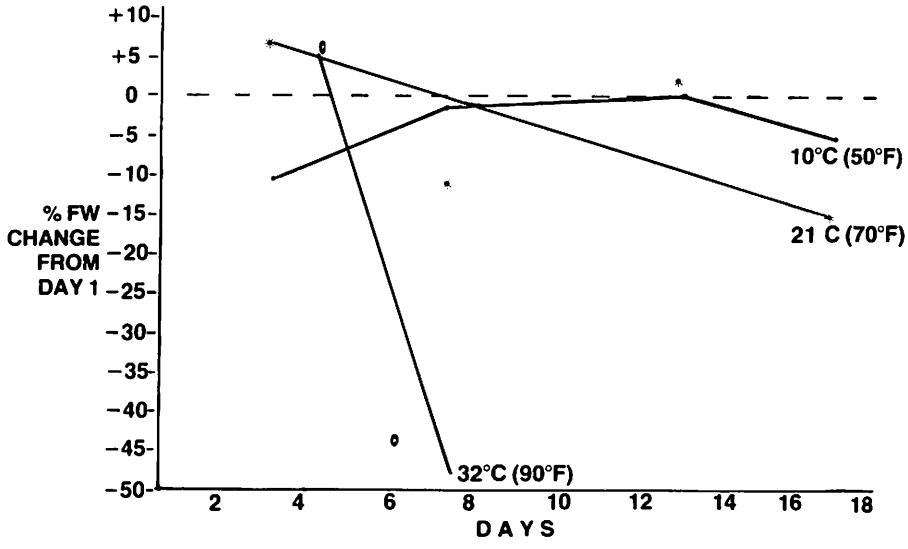

FIG. 1. Marigolds — Effect of Storage Temperatures on Keeping Quality

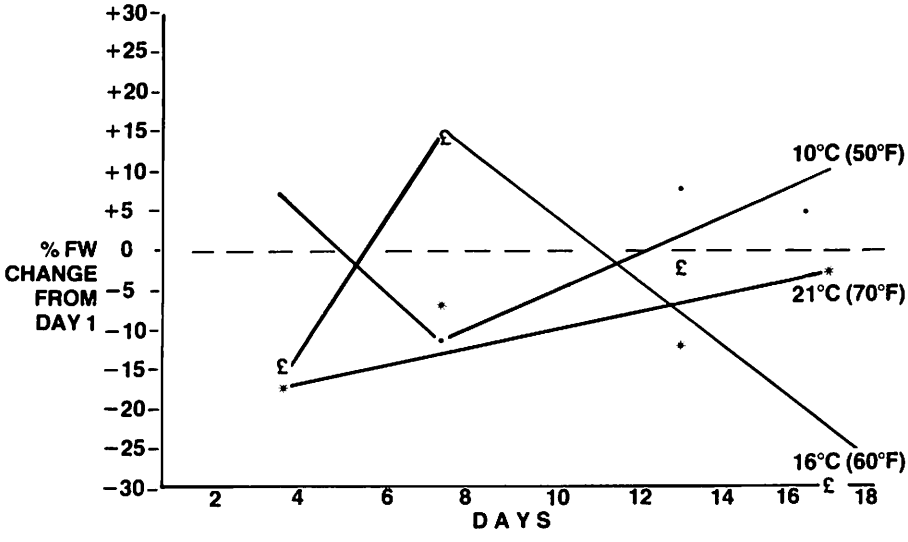

FIG. 2. Marigolds — Effect of Greenhouse Night Temperatures When Stored at 50°F.

decline in flower production. The appearance of purple foliage in the 50°F chamber and yellowing of the foliage in the 70°F chamber after fourteen days indicated the beginning of stress conditions. The foliage discoloration in the 50°F chamber might be due to an increase in red-purple pigment production which occurs during prolonged lower temperatures while yellowing could be attributed to a depletion of nutrients from the elevated respiration rates in constant 70°F storage.

Based on the proceding data, we found that the estimated number of marketable days is mainly dependent on storage conditions and night temperatures rather than duration of night temperature (Table 1).

IMPATIENS: As with marigolds, the impatiens demonstrated a gradual FW loss from day one to completion of the study regardless of NT treatment except for plants stored in the 70°F chamber which showed only a 1% loss (Fig. 4). Plants maintained the highest FW in both the 50 & 70°F storage when grown at the 60°F NT followed by the 50°F NT and showed the greatest loss when grown at the 70°F NT.

Visually, impatiens stored in the 50°F chamber retained good KQ throughout two weeks of observation except for flowering decline as with marigolds. In 70°F storage, purple foliage appeared on the new growth after one week and internodal elongation after eleven days. In the 90°F chamber, the plants were dead after four days. The purple foliage would probably not affect marketability. Even though the plants recorded the highest FW when grown at the 70°F NT, constant high heat leads to a very rapid demise of the plant even when well watered. This indicates that impatiens do not tolerate heat well and are especially sensitive to high keeping temperatures.

As with marigolds, marketable days for impatiens are dependent on greenhouse night temperatures and keeping temperatures while duration of NT appears to be of little importance within a three-week time period (Table 2).

SUMMARY: This experiment demonstrated that even though both marigolds and impatiens recorded the highest FW when grown at the 70°F NT for up to three weeks preharvest postharvest keeping quality was optimum for marigolds grown at the 50°F NT and for impatiens when grown at the 60°F NT. This, perhaps, should indicate to growers that even though higher night temperatures will produce a larger plant at harvest time, deterioration might be more rapid at the retail level. It also suggests that "larger", based on FW, may not necessarily mean "healthier" after the plant leaves the greenhouse. The shelf life of a poorly produced plant will probably not improve at the retail level. It might be mentioned here that we chose the 10% figure as the maximum FW loss for marketability as a realistic figure based largely on findings in our laboratory and in the literature.

The experiment also showed that variation in duration of NT has very little influence on KQ. This is important to the grower in that night temperatures may be lowered to 50°F for up to three weeks preharvest lowering energy costs while still maintaining plant KQ.

Table 2
Impatiens — Estimated Marketable Days
(Based on 10 percent FW loss and visual data)

		Greenhouse Night Temperatures (1,2 or 3 weeks)		
		50°F	60°F	70°F
Storage Temperatures	50°F	12	15	10
	70°F	15	15	15
	90°F	0-2	0-2	0-2

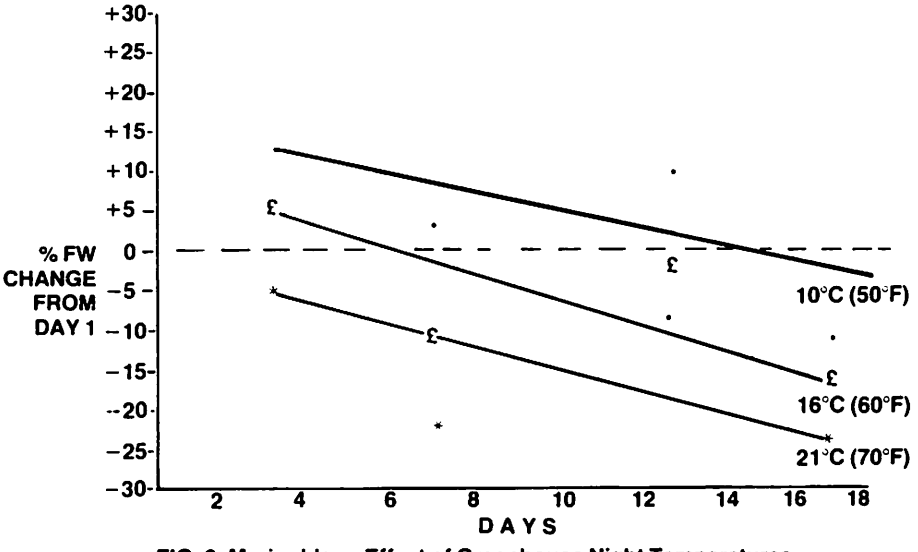

FIG. 3. Marigolds — Effect of Greenhouse Night Temperatures When Stored at 70°F.

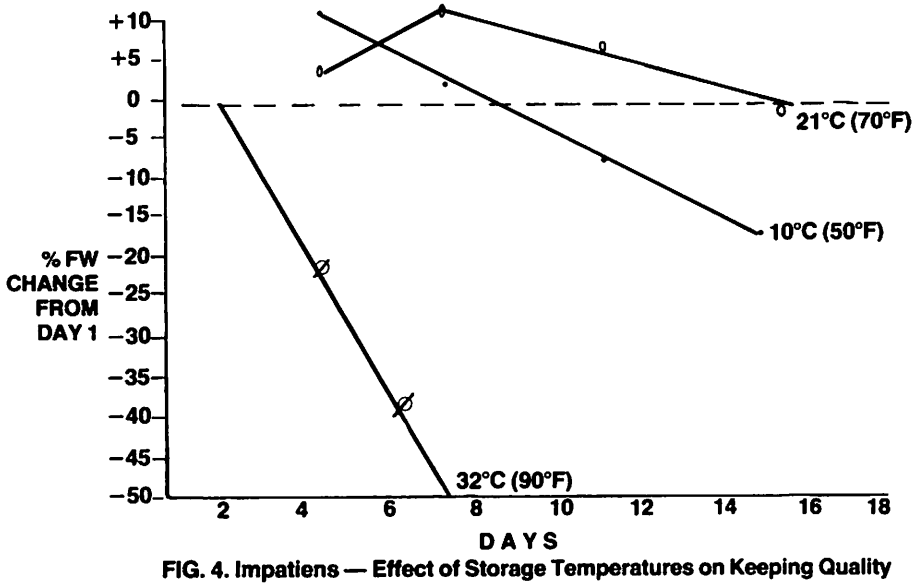

FIG. 4. Impatiens — Effect of Storage Temperatures on Keeping Quality

REFERENCES

1. Voigt, Alvi O. - Bedding Plants Boomed in '79 - Bigger Boom in Store for '80 - BPI News - Feb., 1980.

2. Carpenter, William J. - Environmental Factors: Temperature, Light, CO2 - BEDDING PLANTS - A PENN STATE MANUAL - p. 167, 1976.