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NIGHT TEMPERATURES FOR MINIATURE CARNATIONS

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The number of miniature carnations grown in the United States is on the increase due to their wide range of colors, good keeping quality, and versatility. Miniatures have a different form and different breeding lines than those of standard varieties, which on the whole were developed from 'William Sim'. It would seem evident that miniature carnations may have different environmental requirements. Experimental results from Colorado State University indicate that optimum growth could be obtained at a night temperature equal to or lower than that recommended for standard carnations. However, there appears to be more variation in sensitivity to temperature among miniature varieties. With the evolution of miniature varieties, temperature requirements will in part determine the success or failure of varieties for use in commercial production. An experiment to be conducted this year will evaluate the possibility of exposing miniatures to split night temperatures in an attempt to reduce heating costs and maintain quality as this possibility is indicated by this experiment.

Materials and Methods

On June 17, 1977, the varieties 'White Feathers', 'Starfire', 'Tinkerbell' and 'Goldilocks' were planted, 3 plants per square foot, in 5 ft² plots in soil and gravel raised benches. Plots were replicated in each bench within four identical compartments of a fiberglass greenhouse. Each 15 by 17 foot compartment was cooled at 70°F with a fan and pad system and radiant heated to 62°F during the day with perimeter and overhead pneumatically modulated steam pipes. Centrally located fans circulated the air to reduce temperature variations within the compartment and aspirated control boxes helped to eliminate errors in temperature control and recording.

Night temperatures for compartments A, B, C and D were 49°, 55°, 58° and 52° respectively. These temperatures were only obtainable when the outside temperatures were cooler than these prescribed temperatures. Temperatures could be maintained within ± 2°F.

Carbon dioxide levels were maintained at a minimum of 500 ppm when the compartments were not ventilating. Gravel benches were automatically watered with a nutrient solution 2 to 4 times daily for 2½ minutes depending on the time of year. The soil beds were watered manually with the same nutrients.

The plants were not pinched. The first crop was cut to the first vegetative break and successive crops were cut below the second vegetative break. The flowers were cut every other day unless production was low. Each stem was measured to the nearest centimeter from the top of the uppermost flower to the first vegetative node. The total number of buds and flowers were recorded. The number of saleable flowers were also observed. Any flower with petals 1 cm or more above the calyx was considered a saleable flower. The weight to the nearest gram was taken for each stem. The data from each plot was compiled weekly starting August 8, 1977, and ending the week of May 28, 1978.

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Results

There was no statistical difference in production between night temperature treatments or media (Table 1). However, night temperature did affect other growth characteristics. Stem length and fresh weight were significantly greater at 49° and 52°F night temperature than at 55° and 58°F. Although night temperature had no effect on the number of open flowers per stem, there was a significantly greater number of total buds and flowers per stem at 49° and 52°F than at 55° and 58°F (Table 2).

Table 1. Stems per square foot of four miniature carnation varieties at four night temperatures. Production was from August 8, 1977 to June 3, 1978 (42 weeks).

Night Temperature	'White Feathers'	'Starfire'	'Tinkerbell'	'Goldilocks'
49°F	44	37	45	49
52°	48	36	50	48
55°	45	40	43	41
58°	57	40	47	44

Table 2. Average stem length, fresh weight, and number of buds and flowers of four miniature carnations grown at 49°, 52°, 55° and 58°F.

Night Temperature	Stem Lenght (inches)	Fresh Weight (ounces)	Number of Buds and Flowers per stem
49°F	19.7	1.12	8.1
52°	19.5	1.13	8.3
55°	17.7	0.97	6.8
58°	17.6	0.95	6.7

The low night temperatures did not delay timing in 'Starfire' and 'Goldilocks', (Figure 1) while 49° and 52°F delayed 'Tinkerbell' by 2 weeks. 'White Feathers' at 58°F night temperature peaked 3 weeks earlier but stems were noticeably weaker than at the other temperatures (Figure 2). At all temperatures, flowering of 'White Feathers' and 'Tinkerbell' occurred 6 weeks after 'Goldilocks' and 'Starfire' (Figure 3).

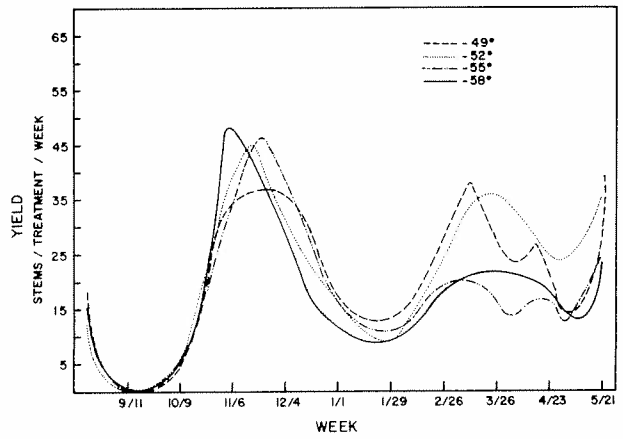

Figure 1: Relative average weekly yield of four miniature carnation varieties grown at 49, 52, 55 and 58°F night temperatures. Planting date was June 17, 1977, with no pinch applied to the plants. No significant difference was noted in the yield at these temperatures.

Very few flowers throughout the experiment exhibited calyx splitting. Thus, night temperatures apparently had little effect on this phenomenon. Stems at the higher night temperatures had a tendency to be weak, but at low temperature brittleness increased.

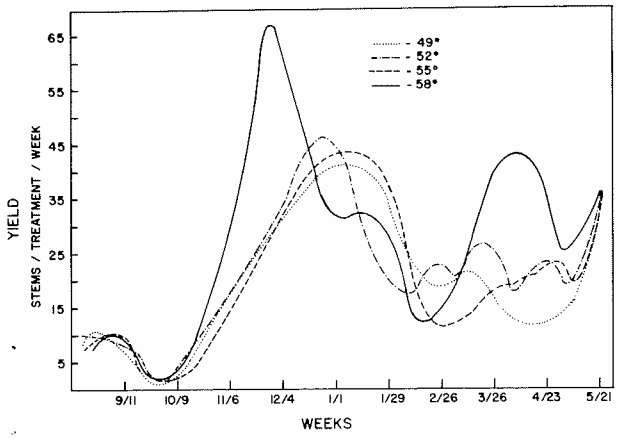

Figure 2: Relative weekly yield of 'White Feathers' minature carnation grown at 49, 52, 55 and 58°F night temperature. Planting date was June 17, 1977, with no pinch applied to the plants. Although yield was increased, quality of carnations was decreased at 58°F night temperature.

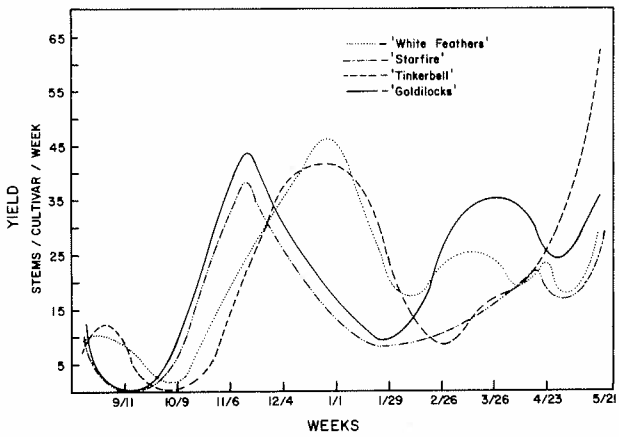

Figure 3: Relative weekly yield of 'White Feathers', 'Starfire', 'Tinkerbell' and 'Goldilocks' miniature carnations grown at 52°F night temperature. Planting date was June 17, 1977, with no pinch applied to the plants. 'White Feathers' and 'Tinkerbell' flowered six weeks later than 'Starfire' and 'Goldilocks'.

Discussion

Results of this study indicate that miniature varieties respond differently to night temperatures than do standards. In general the ideal night temperature seems to be 52°F. 'Goldilocks' grew best at 49°F suggesting that there could be more varieties well suited to night temperatures below 50°F. It is possible to grow miniatures below 50° since they are not very susceptable to calyx splitting, but the planting time and cutting height would have to be adjusted for fall crops to compensate for slightly slower growth of some varieties. Night temperatures seem to have little effect on spring production which is influenced more by light. The first crop from unpinched plants tends to be quite weak due to the summer heat, but more than half the flowers cut were saleable, which could pay for the cuttings.