COLORADO GREENHOUSE GROWERS ASSOCIATION, INC.

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LOW TEMPERATURE SELECTION FOR STANDARD CARNATIONS GOOD IN THEORY; POOR IN PRACTICE

Joe J. Hanan[1]

In 1975, Gianotti (CFGA Bul. 312) began to attempt selection of standard carnation varieties for tolerance to low night temperatures (48°F) as an energy conservation measure. This work was continued by Riese (CFGA Bul. 336) and Moxon (CFGA Bul. 349). By 1978, we had obtained sufficient material to test for tolerance to low temperature and compare them with standard varieties selected for performance under conventional conditions.

In order to obtain sufficient area for low temperature work, production testing and selection after Gianotti's efforts were carried out in the ground under double air inflated polyethylene. Night temperatures were set at 48°F; day temperatures at 62°F with ventilation at 66°F. CO_2 was injected. Each year of testing the selections listed in Table 1 were re-selected and increased for further testing. The greenhouse was recovered September 11, 1979.

Each of four selections for the 1979-80 year and two standard varieties, 'CSU Red' and 'White No. 1' were planted July 5, 1979, in 3 randomized plots of 30 plants each and given 1½ pinches. Flowers were graded when cut, and the tags for grade collected at the end of each month on a per plant basis. Records were obtained for 6 months of flowering, November through April, 1980.

The results show that total yield of the selections was not particularly outstanding, in some instances being significantly lower than either 'CSU Red' or 'White No. 1'. Grade was not outstanding for any selection or variety, all of them being uniformly low on a scale of 2 for design to 5 for fancy.

We began to see single flowers in some of the selections this year (Fig. 1), indicating the fact that under such low

Table 1: Yield and grade of 4 standard carnation selections selected for low temperature tolerance compared with two varieties not selected for low temperature tolerance. Record kept on a per plant basis.

	Selection						
	IV-2NR (Elliott White)	VI-1NR (Atlantis)	VIII-3NR (CSU Red)	VI-3 (Atlantis)	CSU Red	White No. 1	HSD*
Yield**	25.9	23.1	20.3	24.0	24.0	26.8	2.5
Total yield***	2343	2078	1808	2160	2161	2411	
Percent difference from CSU Red	+8	-4	-16	0	-	+12	
Mean grade	2.84	2.70	2.75	2.66	2.85	2.69	0.17

*Difference required between averages for statistical significance with a 95% probability of being correct.
**Average total yield per plant, November through April, 1980.
***Total yield from 90 plants, 3.0 plants per sq. ft.

[1]Professor, Department of Horticulture, Colorado State University, Fort Collins, CO.

temperatures we were selecting away from doubleness in order to avoid bullheads and splits. Several years ago, in a study on splitting in carnations, Holley found that such selection was easy to obtain. Reds were almost invariably "bricky" and faded (Fig. 2), and a typical white flower is shown in Fig. 3. Almost always the outer row of petals

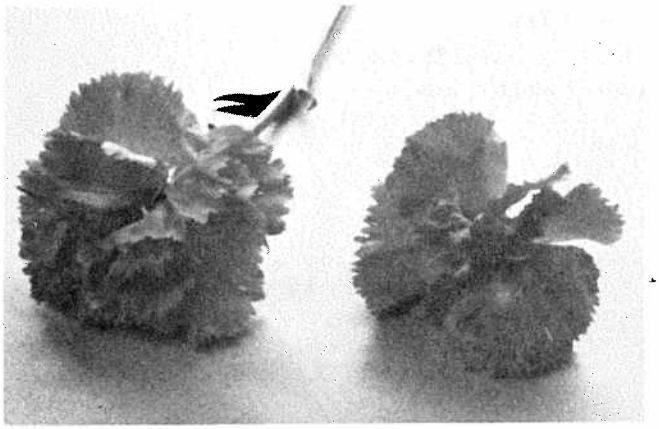

Figure 1: What often happens when standard carnations are selected while being subjected to low night temperatures over several years. Flower on the right is single petalled.

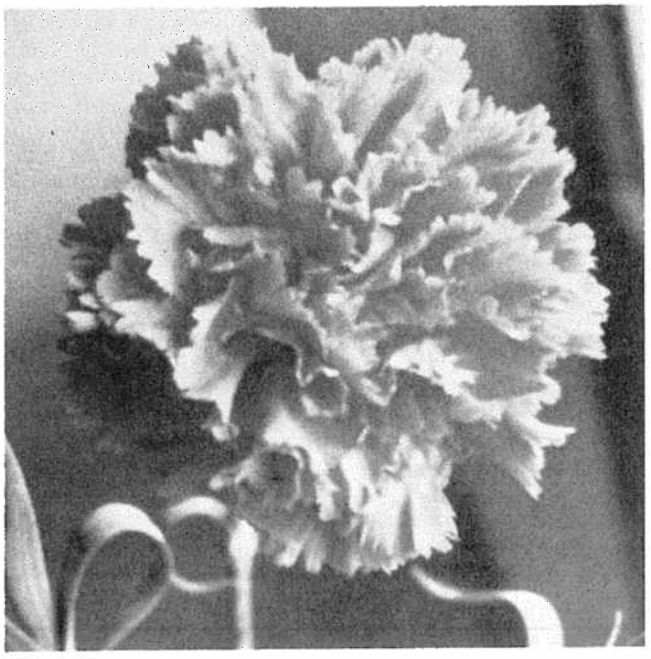

Figure 2: Typical faded, "bricky," red, standard carnation flower when grown at low night temperatures (48°F).

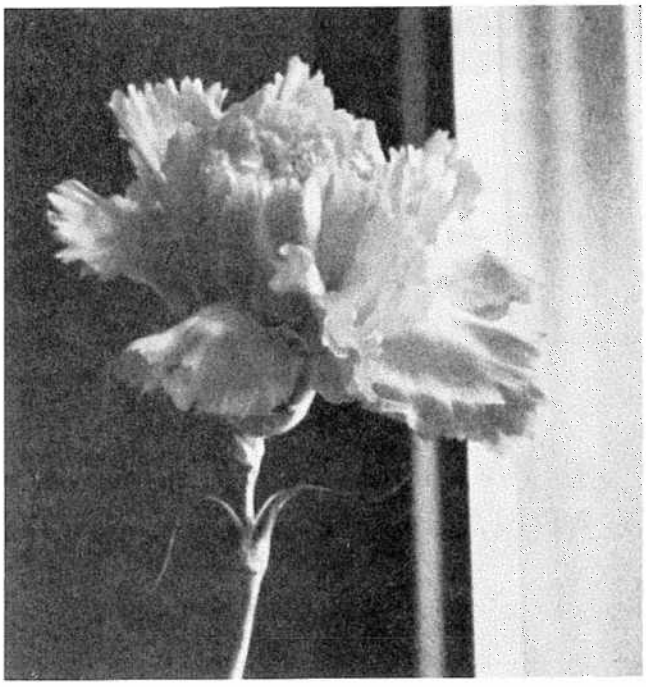

Figure 3: Typical abnormal carnation flower opening when subjected to lower than recommended temperatures at night. Outer layer of petals open horizontally, while center of the flower remains tight with petals upright.

opened out horizontally, but the inner petals remained upright and tight. If the flower remained on the plant for several additional days, the center eventually opened. We feel the symptom of outer petals horizontal and center petals upright is a typical expression of standard carnations subjected to too low night temperatures. This was a major reason for reduced quality.

Practical experience in Colordo has indicated that double polyethylene is not a satisfactory cover for standard carnations. Also, the further one goes from the initial shoot-tipping and heat treatment process, the more likely are recessive mutations to show, with a gradual reduction in desirability. By the time we had reached this year's trial, some of the selections were at least 6 generations from their initial shoot-tipped parent. To have permitted a good trial, we should have continuously shoot-tipped our selection.

In the final analysis, selection for low temperature tolerance is an item good in theory but not particularly good in practice. It reinforces our present belief that there are more economically viable methods for heat conservation than turning down the thermostat on standard carnations.