

Preharvest Environment — Field Study

A test was designed to study the effects of different production environments on carnation flower keeping quality. Also provided was data on the amount of variability in keeping quality between growers and its seasonal variation.

Ten test growers (designated 1-10) were chosen to encompass all areas of Denver. The general plan was to make a case history of each of the test growers in regard to the production environment and methods of handling the flowers. Also considered were the marketing systems of the growers. Four wholesale outlets cooperated in this study:

1. Denver Wholesale Florist Co.,
2. Davis Bros. Inc.,
3. Associated Wholesale Florists, and
4. Rocky Mountain Floral Co.

Flowers of 'CSU Red' in a normal market stage were picked up every other week from the cooperating wholesale houses representing the test growers. Samples were taken over the period of August 29, 1973 through March 13, 1974. The flowers were brought to the wholesale house and held dry until

picked up the same day. A sample consisted of 25 standard grade flowers. An attempt was made to pick up the test sample on the same schedule each date. As the flowers were picked up, they were put in a commercial shipping box and covered with plastic. During the warmer months of the tests, the box was iced. The flowers were brought directly to Ft. Collins and placed in the test solution. Each sample was split in 3 vases of 8 flowers each. Occasionally flowers were not set out by the wholesale house so data is incomplete in some instances.

Periodically 8 of the test growers were visited to observe the growing environment they provided. General observations were made in the following areas:

1. Type of growing medium
2. Age of plants
3. Watering systems and watering practices
4. Type of growing structure and covering
5. If supplemental CO₂ added and how
6. Type heating system
7. Disease problems
8. General appearance of the plants

These observations were utilized only as a means of subjective comparisons.

Specific information was taken in addition to the above general observations. Random core samples were taken from the soil benches used by the growers, and a soil analysis made. Leaf samples were taken for a tissue analysis for elements important to optimum plant performance. Water analyses for the test growers were also provided. These analyses in combination with the soil sample and tissue samples provided an objective means of analyzing potential plant performance problems.

Energy measurements were taken at flower level within the growing structures of all test growers. A reading was also taken outside and the percentage of light available was calculated. Climatological data was obtained from the weather bureau in Denver. Temperature and percent of possible sunshine data for the test period were utilized in comparisons with grouped data.

Information on handling practices of the test growers was obtained for further subjective comparisons. Observations were made on the following:

1. Method of grading
2. Method of delivery of the flowers to the wholesale house
3. Stage of opening at harvest
4. Length of time from harvest until received by the wholesale house

5. Whether flowers held dry or in water
6. Use of refrigeration

Results of the field test indicate keeping life to be variable. Significant variability between a few growers is shown in Fig. 2. However, generally speaking, average keeping life of the flowers was a good 7.0 day average.

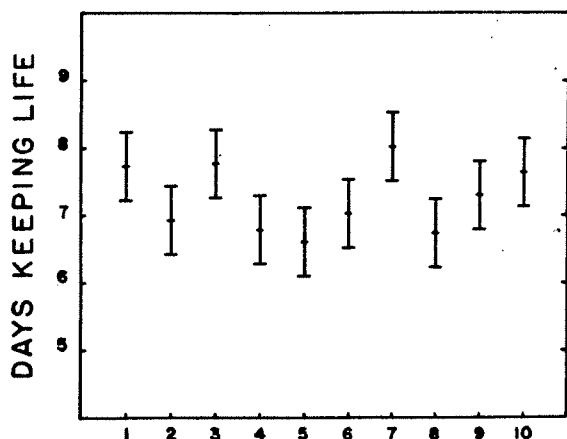


Figure 2. Variability in carnation cut flower life of samples from 10 growers. Means of biweekly sampling from August 29, 1973 to March 13, 1974.

General cultural observations contributed little to explain keeping life variability. No gross differences were apparent in the general cultural programs of the test growers that might explain differences in the average keeping life of the flowers, but a large difference was not established. Soil, tissue, and water test results provided no information that could be attributed to differences found between growers.

Fig. 3 presents the mean keeping life of each test as a composite versus the average number of sunshine-hours accumulated from one test date to the next. Keeping life is related to available light during the low light months of winter. Although not enough data is present to be conclusive, it is speculated that during conditions of high light, keeping life is not as responsive to light because during other periods of the test a relationship to light was not apparent.

Observations on handling of the flowers after harvest by the growers indicated good practices. Most growers cut and graded the flowers one morning, stored them dry in refrigeration overnight, and delivered them to the wholesale house in a non-refrigerated truck the next morning.

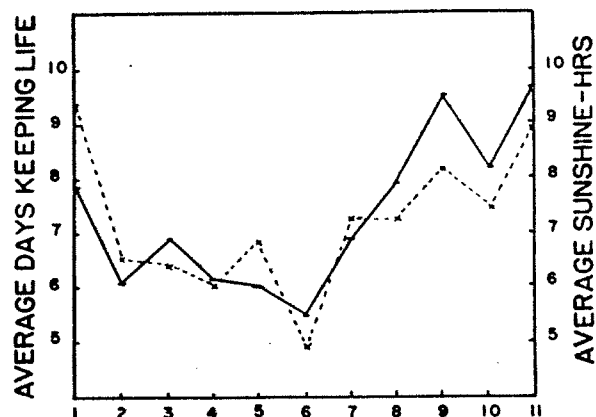


Figure 3. Average carnation cut flower life for 10 growers compared to hours of sunshine per day accumulated between each test date. The test dates are at two-week intervals from October 24, 1973 to March 13, 1974. A coefficient of correlation of 0.81 was obtained during this period of 'low' light. Keeping life is the solid line, sunshine the dotted line.

Summary and Conclusions

Keeping life of cut carnations was found to be variable within a narrow range. Daily and seasonal variation was established as well as some differences between keeping in flowers produced by commercial growers. However, differences between growers was not great.

The general nature of the study made it difficult to relate keeping variability to the environment. Possible sources of variability were investigated. Variability within a production bench suggests that keeping life of carnations could be influenced by environmental differences between microclimates or possibly the variation between the plants themselves. Age of plants is considered a source of variability and was one of the more noticeable differences within and between commercial greenhouse ranges. Production media, and a nutrition-watering combination of tests showed no major influence on keeping life. Stage of opening of the flower at harvest was shown to cause a reduction in keeping life of those flowers left on the plant during a high energy period. Although tests conducted during periods of low energy did not show this influence of stage of opening; high energy periods during the winter probably would cause some reduction in keeping life if flowers are allowed to remain open on the plants.

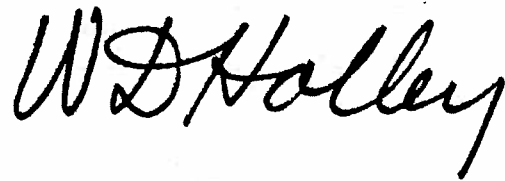
General observations in the production ranges of test growers showed no gross differences in the total production environment provided. The influence of greenhouse coverings on available radiation was the most variable factor observed. Good production environments were seemingly reflected in good keeping life of the flowers tested.

Keeping life was related to light during the months of the year when light could be considered limiting. Although not confirmed, it was felt that, at higher energy levels, the effects and interaction of the environment become much more complex in their influence on keeping life. This was indicated by the

variable results of tests conducted at different times of the year.

Keeping life of cut carnations is complex and basic research is needed to determine exactly what makes the flowers keep. Production environments are also complex and it is difficult to separate environmental effects on something as naturally variable as a plant. Very accurately controlled experiments would be necessary to be conclusive on specific effects of the preharvest environment on life of cut carnations. However, the general results of this study indicate that if an optimum production environment is provided, carnations with good keeping quality can be delivered to market outlets.

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