Colorado Flower Growers Association

IN COOPERATION WITH COLORADO A & M COLLEGE

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The Sugar Content of Flower Stems Is a Reliable Measure of Carnation Cut Flower Life

by Richard L. Knappenberger, W. D. Holley, and Merle G. Payne

The total relative sugar content of carnation stems correlated closely with the useful life of flowers cut during a 30-day and a 15-day period during the spring of 1955. Those flowers with the highest sugar content at harvest kept the longest.

As carnation flowers aged, their total relative sugars decreased.

High light intensities the day previous to harvest reduced the total relative sugar content of cut carnations in both early and late spring periods.

High temperatures one day previous to harvest reduced total relative sugars in cut carnations during late spring. This did not occur during early spring, possibly because temperatures were not high enough.

The problems surrounding cut flower life are many and varied. We know from research and experience that cut carnations, and probably other cut flowers, do not keep the same day after day and week after week. Several environmental factors, both preharvest and postharvest have been shown to affect cut flower keeping. Superior keeping quality is essential to satisfactory long distant shipping of cut flowers.

The purpose of this investigation was twofold. First, could the sugar content of carnations be used as a basis for predicting potential cut flower life? Secondly, could the sugar content be correlated with light and temperature preceding cutting?

General Methods and Procedures

To determine the keeping life of cut carnations, samples of five stems each were placed in a container of water of neutral pH and kept at nearly constant temperature and humidity. Flowers were considered to have reached the end of their useful life when the petals began curving inward, became slightly discolored and lost their turgor.

Several chemical methods of testing the sugar content of plant tissue were tried and discarded because test results could not be duplicated. All sugar measurements in this investigation were made by use of Johnson's (1) modification of one dimensional paper chromatography as originally outlined by Partridge (2). The sugar measurements were obtained in square inches rather than in percentage of the expressed juice. The measurements are of total relative sugars, including fructose, sucrose and glucose.

Change in Sugar During the Keeping Period

Six samples of five stems each were frozen immediately after harvest while six other samples from the same bench were placed in the keeping room. After seven days in the keeping room the second group of samples, which were still in useful condition, were frozen. The juice was then expressed from the fresh and the old carnation stems and tested for sugars. An average of 64 per cent of the sugars was used in the seven days of keeping life.

Day to Day Sugar Content and Flower Life

Twenty flowers were taken from the daily cut of Red Sim during the period from February 16 to March 17, 1955. Five stems were selected at random and tested for sugars. The remaining 15 stems were placed in a keeping room at a temperature of 64° F ± 2° with a relative humidity of 42 to 58 per cent. The average keeping for each day's cut and the daily sugar contents are shown graphically in Fig. 1. Both the sugar and mean keeping life declined from February 16 to February 26, then increased until March 17, when this test was terminated.

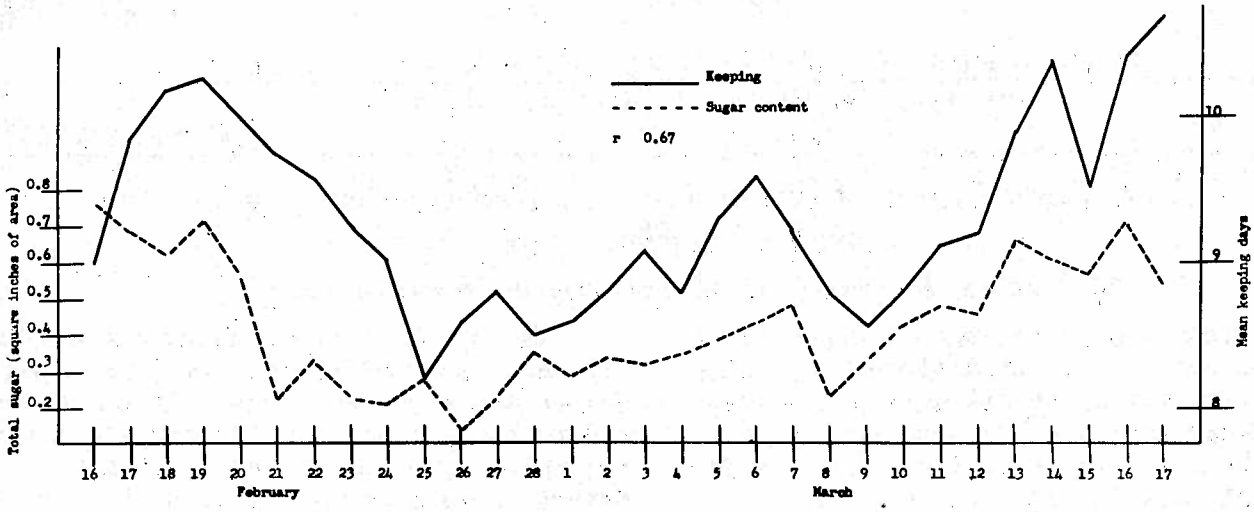

Fig. 1 Correlation of total relative sugar content and mean keeping life of Red Sim carnations for the period February 16 to March 17, 1955.

A second test covered the 15-day period from June 7 to June 21, 1955. Fifteen flowers were taken from the daily cut of White Sim. Five stems were tested for sugars and ten were placed in the keeping room at a temperature of 63°F ± 3° and a relative humidity of 88 to 98 per cent. Except for minor variations, the daily sugar content followed closely the mean keeping life (Fig. 2).

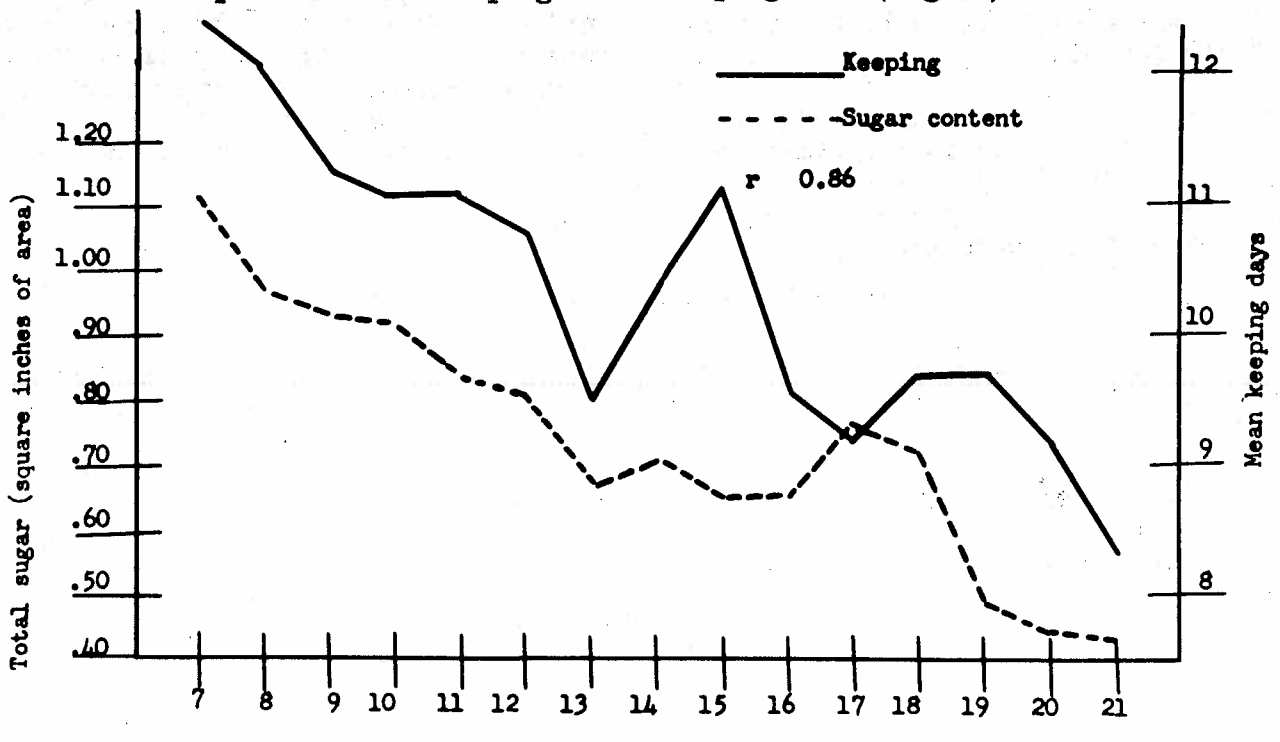

Fig. 2 Correlation of total relative sugar content and mean keeping life of White Sim carnations for the period June 7 to June 21, 1955.

Preharvest Light and Temperature Effects on Sugars

Continuous light and temperature records were kept during the time of this investigation. Significant negative correlations between light intensity one day previous to harvest and sugar content were obtained for both the period beginning February 16 and the period beginning June 7. This means that the higher the total light intensity, the lower was the sugar content in flower stems cut the following morning. No correlation was found between sugar content and the sum of light two or three days previous to harvest. The authors feel that light intensity measurements give very good indirect measurements of plant temperatures. On bright days the plant temperature may get so high that less sugar is assimilated.

A highly significant negative correlation was obtained for the period beginning June 7 between the temperature one day previous to harvest and the sugar content of flower stems at harvest. Flowers cut on mornings following hot days had less sugars. There was no correlation between sugar and preharvest temperature for the February 16 period, probably because temperatures were much cooler. Neither was there a correlation between sugar and the sum of temperatures two or three days previous to harvest.

Since sugars play such an important part in the life of cut carnations, we must reevaluate all of our cultural and handling practices in light of their effects on sugar assimilation and use. Quite a lot is known about the general phases of carbohydrate manufacture and use by plants. Much specific information is needed if we are to outline the optimum conditions for sugar assimilation by various plants.

Literature cited

1. Johnson, Gestur. 1955. Unpublished data. Colorado A & M College.

2. Partridge, S. M. 1948. Filter paper partition cromatography of sugars. Biochemistry Journal. 42: 238-248.

Red Delight Roses May Be Pruned Low

by W. D. Holley and Walter F. Larsen

Pruning Red Delight roses to 12 inches did not reduce the yield when compared to that from bushes pruned to 18 or 24 inches from the soil level. The average stem length was shortened slightly by the two lower pruning heights.

Although most greenhouse rose plants are cut back gradually, there are times when the "hair cut" type of pruning is necessary or advisable. Work by Kamp and Weinard at the University of Illinois in 1946 showed that the pruning of Better Times rose below 24 inches reduced yield without loss of stem length. The following year they pruned several varieties to 24, 30, and 36 inches. Yield was increased on Better Times at the higher pruning heights, but stem length decreased when plants were pruned at levels above 24 inches. The variety Mrs. Roosevelt responded exactly opposite to Better Times, yielding more flowers from the 24-inch pruning height and fewer from the 36-inch level. This indicates that pruning information for different varieties is not easily generalized. Each variety or group of sports may respond differently to pruning.

The reduction in height of rose bushes becomes more of a problem as we adopt better cultural methods and taller growing varieties. Especially is this true when plants are grown on raised benches. With this height reduction problem in mind, three benches of 2-year-old Red Delight roses were divided into three equal plots per bench. The bushes were cut back to 12, 18 and 24 inches from the soil level on June 30, 1954. The pruning heights were arranged in a latin square so that no treatment received a favored position in the benches. All canes resulting from the prune were soft-pinched once before flowers were cut from the plants. Flowers were harvested from September 11, 1954 to July 6, 1955 and graded by stem length in 3-inch categories from 9 to 24 inches. Flowers with shorter than 9-inch stems and those with imperfect stems or heads were counted but not included in the number of saleable roses.

The yield of saleable blooms from bushes pruned to 12, 18 and 24 inches was almost exactly the same (Table 1). The average stem length from plants cut back to 24 inches was significantly longer than from the other two pruning heights, however this difference was very small. Only 1.1 per cent of the flowers harvested in this experiment were sufficiently faulty to be

graded as work roses. Production of saleable roses per square foot of bench area during this period of just over a year was 31.9.

Table 1. The effect of three pruning heights on yield and grade of Red Delight roses.

Pruning height	Total yield of saleable roses	Mean stem length in inches
12 inches	2093	14.26
18 inches	2101	14.24
24 inches	2101	14.39

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