CHAPTER 19

POST-HARVEST LIFE

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The ultimate aim of the commercial producer of roses is to provide to the consumer a flower that is of the highest quality, that will last the longest period of time and thus provide the maximum satisfaction. To accomplish this requires the complete efforts of the grower, the wholesaler and the retailer — each applying the most up-to-date knowledge and methods available for maximizing the post-harvest life of the cut flower.

Significant effects of pre-harvest treatments have been found to influence the lasting life of cut flowers. It has been estimated that ⅓ of the cut flower life is influenced by the pre-harvest environment and the remaining ⅔ by the handling and environment the flower is exposed to after harvest.

Pre-harvest Treatment

The sum total of the growth process is the manufacture of sugars. When light, temperature, nutrients, water and other factors are supplied at optimal levels for plant growth, sugars and food reserves will then be at their maximum in cut flowers. Such flowers can then be expected to have a maximum post-harvest life. Although the examples referred to may not always be roses, the information derived is applicable to the handling of roses.

Light

Since light has a profound affect on the production of sugars in the plant it should have a direct relationship to the keeping life of the flower. Mastalerz (1952 b) worked with chrysanthemums and determined the effects of reduced light intensity on cut flower life following storage. He found:

1. The lasting life of the same variety was twice as long when grown to maturity under high-light conditions (spring and summer) compared to low-light conditions of winter.
2. Artificially reducing light intensity prior to cutting reduced both vase life following storage and the length of time flowers could be successfully stored at 31°F.
3. The difference in lasting life of flowers from shaded and unshaded plants was greater in summer than winter.

Howland (1945) found that in the winter and spring roses cut late in the afternoon (4:30 pm) kept longer than those cut at 8:00 am. During

the hot weather of early August, afternoon cut roses kept longer than the morning cut. This fact could be related to the higher carbohydrate content of the plants. Howland also measured the diurnal changes that occurred in rose leaves (1945). Twice daily measurements made in April and December showed a continuing increase in dry matter in April following increasing light; while in December under poor light conditions, reserve foods were barely maintained. Mastalerz (1952a) (1953a) (1953b) also showed flowers cut in November or December have a shorter vase life than those cut during the months from July to September. Tinga (1956) found roses cut from the top of the plant where light is best kept better than roses cut down in the bush or on the sides of the plant. Kohl (1961) reported low light and forcing at high temperatures caused more difficulty with neck wilt in roses. Neck wilt was also associated with cutting flowers at an immature stage of growth.

Temperature

The effects of light are difficult to separate from those of plant temperature. Excessively high temperatures may result in a rapid depletion of carbohydrate reserve especially when light intensities are low or when the grower does not make an additional effort to cool the greenhouse. Fairchild (1959) working with carnations found the poorest keeping life of flowers during September and October as a result of high temperatures. Best lasting life occurred in late spring. High day temperatures have also been noted to cause a bleaching of the color of flowers, thus reducing their quality.

Nutrients

Where nutrients in the soil are in a normal range for optimum growth to take place there will be little effect on lasting life (Holley, et al. 1951). Should a deficiency occur there is an adverse effect on the lasting life of the cut flowers. Potash deficiency shortens the life of cut flowers (Holley, 1954). High potassium (Twigg, 1953) has been reported to increase the tendency to cause bluing in red roses and also possibly reduce the incidence of neck wilt. Calcium deficiency reduces cut flower life and prevents normal opening of the flower (Mastalerz, 1960a) (Peterson, 1960). A deficiency or an excess of boron may be expected to reduce cut flower life.

Disease

The presence of disease organisms in the soil or in the plant has a significant effect on the lasting life of the plants (Williamson, 1963). Vascular organisms get into and move through the water conducting system in the plant. These organisms produce toxins and also mechanically plug the vessals. Cut flowers from such plants would exhibit a severe restriction in water uptake that would shorten their life.

Foliar diseases such as mildew, and flower blights such as botrytis cause excessive production of ethylene. Ethylene shortens flower life by increasing the rate of respiration and petal drop. Increased ethylene production as a result of disease also may cause a reduction in the life of other flowers in the same containers.

Harvest Treatment

Factors that are in complete control of the grower weigh heaviest on the subsequent post-harvest life of the cut flower. Cutting at the proper stage of development is very important. The grower by cutting roses too immature in development can reduce their average life by 36%. Neck wilt or premature wilting is increased if roses are cut too immature; especially in those cultivars that are susceptible to neck wilt (Kohl, 1961).

If roses are cut in the afternoon the keeping life will be increased by 7% in the summer and 11% in the winter (Howland, 1945). Some of the greatest differences are found between cultivars and their keeping life (Parvin and Krone, 1961).

Roses should be cut with a sharp knife. Scissors or shears that produce a crushing effect on the stem should be avoided. A slanting cut is recommended (Parvin and Krone, 1962a, 1962b).

Post-Harvest Treatment

How cut roses are handled immediately after cutting has a profound affect on their lasting life. No treatment is as satisfactory as low temperature conditioning in lengthening storage life. Early work by many investigators and verified by Parvin and Krone (1961, 1962a, 1962b) showed that flowers cut at the proper stage of development should be immediately placed in clean 100°F water to which a preservative has been added and conditioned at 35-40°F for at least 12 hours before shipping. Allowing roses to wilt before getting them into water may cause a reduction in shelf life. Water conducting vessels may develop air blocks or become clogged with dirt.

Preservatives

An integral part of the entire rose handling process is the proper use of preservatives by the grower, wholesaler and retailer. An unbroken chain of good handling practices is necessary for maximum vase life. To preserve the flowers effectively the following requirements for chemicals are suggested (1) reduce bacterial activity, (2) limit respiration, (3) maintain a favorable pH, (4) possess an optimal osmotic value. The available commercial preservatives will generally do all of these things.

Failure to obtain satisfaction where preservatives have been used may be traced to several problems. One of the most important is to use clean containers. Refrigerator cans should be thoroughly washed once a week with a good detergent. A second item is to use the preservative at the strength recommended. Measure accurately both the preservative and the water volume. Too little preservative may not give satisfactory results. Too much may be injurious.

Wholesaler

Careless handling at the wholesale level probably contributes as much to reduced shelf life as any practice. Flowers that are thrown, dropped, slammed down on tables and generally mistreated are damaged and bruised at each incident. Flowers that remain out of water in warm rooms for extended periods of time are reduced in shelf life.

The ideal way to handle cut flowers would be to have them in water

constantly from the time they are cut until received by the consumer. Modern transportation and merchandising methods prevent this kind of treatment.

In place of the ideal, the wholesaler should be encouraged to use the best procedures he has access to for handling cut flowers. Where flowers have been out of water for some time, a half to three-quarters of an inch of stem should be removed. Warm water, 90-100°F with a preservative added, should be used to get the maximum amount of turgidity into the stem and flower.

Refrigerators should be kept clean of old leaf and stem tissue. This will avoid a build-up of ethylene and disease organisms that will shorten flower life. Containers should be kept clean and free of dirt, scum, rust and other materials that could reduce shelf life.

Retailer

Steps that the retailer should follow with roses have been well documented by the work of Krone and his associates (1967).

The retailer should upon receipt of flowers cut the stems on a slant with a sharp knife. Do not use shears or other crushing tools. Do not smash the bases of the stems with a hammer. A sharp knife cut will expose the ends of the xylem (water conducting) vessels so that maximum water uptake will occur. Remove the lower leaves and place the stems in warm water (100°F) to which a good preservative has been added. Condition the roses in a 35°-40°F refrigerator for 4 to 6 hours before arranging them.

When cleaning thorns and leaves do not cut through the bark or scrape the stem. The water conducting vessels lie only a very short distance beneath the bark of the stem (Fig 1). If these vessels are cut through and the cut placed above the water line it will act as an air hole and prevent the movement of water to the flower.

If "foam" materials are used be sure the block of "foam" is thoroughly saturated. Use a preservative in the water. Do not push cut ends of stems through the block of foam. After the stems are once inserted do not move the stem. Unless the cut end of the stem is in contact with the foam it will not absorb water.

Be sure to advise the customers to add water to the container as it is needed.

Summary

A conscientiously followed program of proper handling by the grower, wholesaler and retailer will ensure the maximum cut flower life for the rose for the customer.

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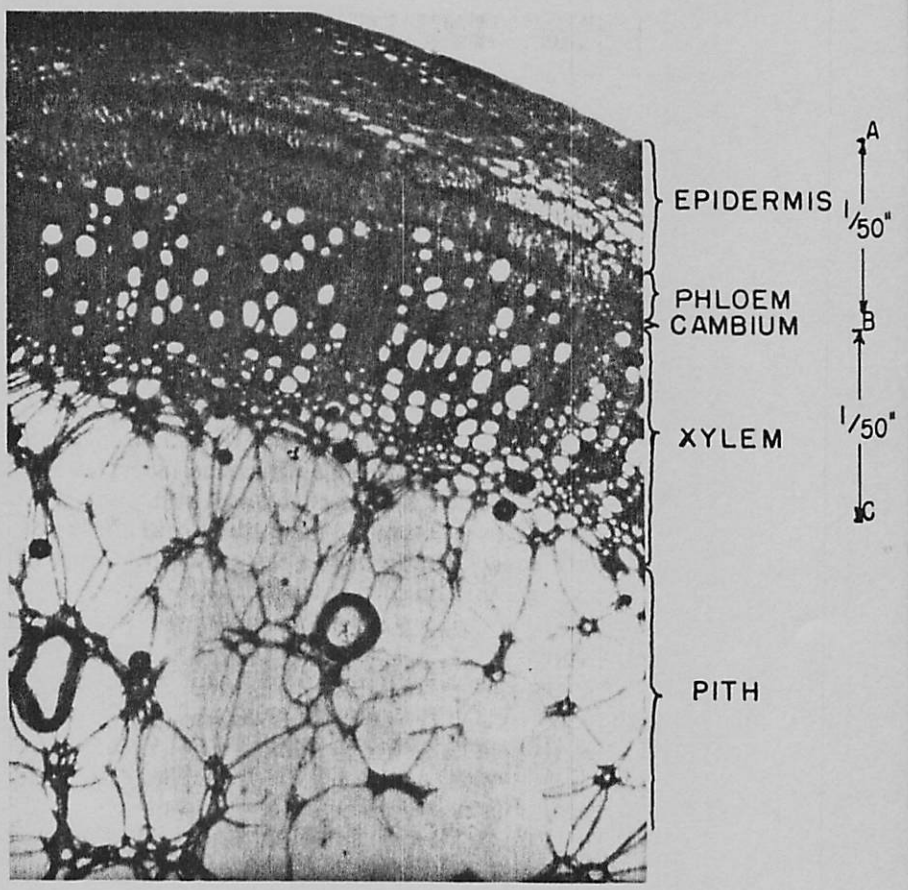

Figure 1. Partial stem cross section of a Colorado #6 rose, taken 8-12 inches below the flower. Flower at normal harvest stage. Magnification 70x. Note the measurement from the outside of the stem to the beginning of the water conducting xylem is only 1/50th of an inch. The xylem is only another 1/50th of an inch; tissue is easily removed by scraping the stem or cutting too deeply on removing thorns.

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