WHEN WAS THE LAST TIME YOU PURCHASED FRESH LONG LASTING CUT FLOWERS?

-or-

HOW TO KEEP CUT FLOWERS LONGER

-or-

POST HARVEST PHYSIOLOGY OF CUT FLOWERS

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Whatever you want to call it, however you slice it, consumers of cut flowers in the U.S. do not always get long-lasting quality flowers. I will also go so far as to say that the average retailer can only obtain flowers that last a minimum of time. True, flowers by their very nature are a most perishable product and one must consider the long, tortuous route from the site of production to the home, office, or funeral home. Too, consider the number of times these delicate items are "packed" (crammed, forced, shoved) and unpacked! It is amazing they survive at all, are not more damaged than they are, and keep as long as they do.

Amazing as it may seem, few changes have taken place over the past 50 or more years in packaging and handling cut flowers. True, there is air transport from distant sites of production to the wholesaler. Yet, few if any, innovations or advances have been made or accepted on a wide scale! Perhaps this lag is unique to our industry.

For example, we hear and read about the harvest and shipment of tight buds of standard chrysanthemums and carnations; they are allowed to open or develop in floral preservative solutions at the site of consumption. Dr. Mourouski, leader of the USDA's cut flower post harvest physiology work in Florida, has initiated and fostered this concept. Granted, opening of buds takes time, space, and expensive solutions. True, the wholesalers or retailers who do this operation must add it to their cost/overhead. Stem and leaf damage can occur. The effectiveness of floral preservatives varies with water supply for each of these because the mineral content of water supplies differ. Nevertheless, this does offer an opportunity to bring a flowering stem into a retailer's shop with the potential longevity of a freshly harvested flower and without damage during shipment. Yet few cut flowers harvested at the normal time are ever placed in floral preservatives. Why not? These preservatives work, they maintain quality and flowers do last days longer!

It is an amazing fact that more floral preservatives are not used. There are a variety of reasons. The following expression should not be a reason: "I do not care, I grow it, or I sell it, and to HELL with its keeping quality for the home owner." I hope the reasons include lack of understanding of the benefits and use of floral preservatives. Preservatives must be used in every bucket of water from the mum fields of Florida, through the wholesaler's refrigerator in Illinois, the retailer's refrigerator in Peoria, to the vase of flowers on the coffee table in Mr. and Mrs. Paul Pansy's home on Main Street. The chain must not be broken if full impact is to be realized.

True, floral preservatives are not the total solution and there are many other problems, but the use of this material should have some industry regulation. Yes, floral preservatives are expensive, but the total long range benefits to one's business and the total industry far outweigh the expense. It really is a shame for someone to waste money on flowers that last only a day or two. When was the last time you took your beautiful product home? Would you have been happy if you had paid the price your customers had to pay? It is difficult to mix the proper concentration or use of the correct amount of preservative in water -- another excuse for not using a preservative. There are many sizes of buckets, cans, and vases, all holding different amounts of water which require a specific measured amount of floral preservative. This is one area where there is a need for the development of a standardized technique for rapid, convenient, and accurate delivery of the water and preservative into the wide variety of container sizes.

Drs. Waters and Woltz in Florida show that water quality makes a lot of difference. Recently, in Minnesota we ran some tests on a "new" preservative and compared it to some of the "old" ones. We were using distilled and St. Paul Campus (well) water. Half way through the series, we were switched from campus to city water. Fortunately, we had distilled water as a control, as the change in water altered our ranking of good/better/best preservative. You may want to run your own water tests on the several flowers you grow, distribute and/or retail.

Water is still a critical consideration and the first post-harvest physiologist must have been a cave dweller, who first observed that a flower lasted longer when it fell into water. Hence he/she started placing flower stems in water. Have we progressed much? Back to water! Plants are 80-95 percent water; hence, all efforts must be made to maintain turgid cells/tissue/organs/stems/leaves/flowers. Recent work on iris by Paulin in France shows the reason why wilted iris may not take up water. If wilting reaches a certain level for a critical length of time, certain irreversible amino

acid/protein changes occur -- something like changes in the egg (protein) when heated. No matter how many times you recut the stem, put it in warm (110°F/43.5°C) water or even hopefully in floral preservative, the iris will not revive. This happens with many flowers: a severe water stress reduces longevity.

Hardening is a term used to describe the process when freshly cut (harvested) stems are placed in warm water (preferably with preservatives) and allowed to take up water while placed in a cool location (refrigerator). The flowers can be covered with plastic to protect from air currents and reduce water loss. During these brief hours flowers will absorb the greatest percentage of water in their lifetime. I observed that fact in the '60's while a graduate student at the University of Illinois. This is why use of preservatives in water is essential at the growers' level. Rise, wholesaler and demand that your grower use floral preservative. Rise up, retailers, and demand flowers hardened in preservative. Your customers will love you for it. Rise up, customer, and demand fresh flowers placed in water containing floral preservative!

Waters in Florida observed that nutrition also influenced keeping quality. An over-fertilized (particularly nitrogen) mum is a poor keeper and prone to Botrytis during shipment. Waters also found that flowers in lighted (rather than dark) cold storage lasted longer.

We keep mentioning cold storage. What temperatures are best? Much of this research was done years ago by USDA. For most species 32°-33°F is great. However, there are exceptions. Vanda orchids store best at 55°F, other orchids at 40°-45°F; however, Cymbidiums can be stored at 32°F!! Anthuriums keep best at 55°F.

Clean buckets and clean refrigerators are a must to keep the micro-organism count down -- even if you use floral preservatives. Why are growers so careless about their water bucket sanitation? There they are, buying disease-free cultured cuttings and spraying their plants for disease control weekly! Then comes harvest! Freshly wounded stems are placed in dirty, stinking water! If you would not want to eat from it, drink out of it, or stick your freshly cut off finger into it, then don't put cut flowers in or on it. Clean the containers on a regular schedule -- once a week if preservatives are used. Devise an automated hot water, soap, and brush cleaning line for your buckets and use floral preservatives in your water.

Keep old, dead, and decaying plants and plant parts cleared out of your refrigerator. Why? The answer is ethylene! Plants, as well as micro-organisms, give off ethylene. Ethylene at only a few parts per billion causes premature aging of your cut flowers. Flowers, leaves, and stems naturally give off ethylene in greater and greater amounts as aging progresses. Ethylene production can be prematurely triggered by ethylene itself. Ethylene is found in many places such as airports where exhaust fumes of aircraft and other vehicles can enter shipping boxes by temperature differential developing between inside and outside air. Ethylene can be removed from the air by brominated-activated charcoal or better yet potassium permanganate.

Note that reduced temperatures reduce ethylene production. Sucrose, 8-hydroxyquinoline sulfate or citrate and sodium azide (all major constituents of floral preservatives) reduce and delay the synthesis of ethylene -- hence, cut flowers keep longer.

One last comment, shouldn't we consider dating our product on a uniform national code? Shouldn't the date of harvest be known to all concerned? We as customers demand and get fresh bread, milk, and coffee. Shouldn't we consider industry-wide sanitary inspection and use of floral preservatives in the total chain from the grower on? We expect meat sanitary inspection and quality fruit and vegetables. Are flowers different? When did you last purchase fresh, long-lasting cut flowers? I feel poor keeping quality is the reason cut flower use has not expanded in relation to green plants and the reason cut flowers lag behind our expectations for developing the industry.

Recommended Levels of Sucrose (Table Sugar) and 8-Hydroxyquinoline Citrate (8-HQC) Mixtures[1] for the Following Flower Types

1. Carnations (Open Flowers)
   4% sucrose, 400 ppm 8-HQC
2. Carnations (Opening Buds)
   2-3% sucrose, 200 ppm 8-HQC
3. Chrysanthemums and General Cut Flowers
   2% sucrose, 200 ppm 8-HQC
4. Gladiolus
   3-4% sucrose, 500 to 600 ppm 8-HQC
5. Roses (Red)
   3-4% sucrose, 200 ppm 8-HQC
6. Roses (Misc. Colors)
   2% sucrose, 200 ppm 8-HQC
7. Snapdragons
   1-2% sucrose, 300 ppm 8-HQC

Steps to Obtain the Recommended Sucrose and 8-HQC[2] Mixture

1. Sucrose Stock Solution:
   1% - 1 pound/12 gal. water
   2% - 2 pounds/12 gal. water
   3% - 3 pounds/12 gal. water
   4% - 4 pounds/12 gal. water
2. 8-HQC Stock Solution:
   1/2 pound of 8-HQC to 12 gal. water
   For the following proportions:
   100 ppm 8-HQC - 1 part of the 8-HQC stock solution/50 parts of the above sucrose solution
   200 ppm 8-HQC - 2 parts of the 8-HQC stock solution/50 parts of the above sucrose solution
   300 ppm 8-HQC - 3 parts of the 8-HQC stock solution/50 parts of the above sucrose solution
   400 ppm 8-HQC - 4 parts of the 8-HQC stock solution/50 parts of the above sucrose solution

   -OR-

   100 ppm - .24 gal. of the 8-HQC stock solution to 12 gal. scurose solution
   200 ppm - .48 gal. of the 8-HQC stock solution to 12 gal. sucrose solution
   300 ppm - .72 gal. of the 8-HQC stock solution to 12 gal. sucrose solution
   400 ppm - .96 gal. of the 8-HQC stock solution to 12 gal. sucrose solution

   Weight:
   100 ppm - .16 oz. 8-HQC/12 gal. sucrose solution
   200 ppm - .32 oz. 8-HQC/12 gal. sucrose solution
   300 ppm - .48 oz. 8-HQC/12 gal. sucrose solution
   400 ppm - .64 oz. 8-HQC/12 gal. sucrose solution

(Other preservatives can be purchased from local florist supply houses and from the various representatives of national supply organizations. Some of the better known products are: Petalife, Everbloom, Floralife, and Roselife.)

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[1] All solutions should be tested or trialed first. The pH of water supply and amount of carbohydrates and etc. metabolic subtrates available in the floral tissue and leaves may alter results.

[2] 8-HQC can be purchased from: Ashland Chemical Co., 8 E. Long St., Box 2219, Columbus, Ohio 43216.