Flower Handlers: Sanitation is Crucial

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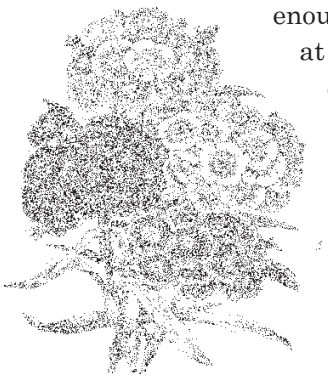
It has been known for years that the growth of bacteria in vase water has a major effect on the vase life of cut flowers. Bacteria grow quickly in any liquid containing sugars and other bacterial foodstuffs. It has clearly been demonstrated that when the number of bacteria in the base of the flower stem increases beyond a certain point, water movement in the stem is restricted, causing flower wilting.

Bacteria, yeasts and other microbes that are bad for cut flowers may be (in their thousands) anywhere. High numbers of bacteria can be found in soil, decaying vegetation, and any water that has been contaminated with organic matter. It is therefore most important that flowers be placed only in containers that have been scrupulously cleaned. Water in which flowers are placed should contain materials to prevent bacterial growth.

Researchers have shown that bacteria start to grow at the base of the stem as soon as flowers are put into water. The reason for this is easily understood - the cut cells at the base of the flower stem release sugars, amino acids, proteins and other materials that are perfect food for the thousands of bacteria that are always present on plant surfaces. If the stems are cut and held dry, the bacteria cannot grow, because they need water to grow in, and the cell contents that are released during cutting rapidly dry up. If the stems are placed in water, however, the situation is perfect for bacteria to start growing . Because the water soaks into the cut stem base, bacteria continue to grow, even if the flowers are now taken out of the water.

This is probably an important reason for the common recommendation that about 1 inch of the stem be removed from the base of cut flowers when you receive them. We have shown that almost all of the contaminating bacteria are removed with that 1 inch of stem. Of course, if you then place the recut stem back in plain water, the whole process starts over - release of cell contents, growth of bacteria, and eventual early death of the flower.



The best way to overcome the microbial problem in the life of cut flowers is to ensure that flowers are placed in water containing compounds that will prevent the growth of bacteria. This is the reason that all successful commercial preservatives contain anti-microbial compounds, or "biocides ", such as HQC (8-hydroxyquinoline citrate), that are intended to prevent growth of bacteria in flower vases and buckets. Unfortunately, if improperly used, preservatives may not control the growth of bacteria. It is vital that the preservative be used at the recommended. concentration.

The reason for this is complex, and involves each of the components of a commercial preservative, which usually are: a source of sugar, an acid, and a biocide.

The sugar is to provide food for the flower , but is also an excellent food for bacteria, even at concentrations well below the concentration in the preservative solution.

The acid has two important functions. Flowers rehydrate best in acid water (pH 3.5-4.0). Since most tap water in the U. S. is somewhat alkaline, acid added to flower preservatives ensures that flowers take up water readily from the vase solution in the critical first few hours after they have been handled dry. Unfortunately, many preservatives do not contain sufficient acid to acidify really hard well waters. We have also shown another important function of acid in a flower preservative - some of the biocides used in commercial preservatives are much more effective (kill more bacteria) in acid solutions.

The biocides used in cut flower preservatives are usually present at concentrations nearly high enough to cause damage to the flowers. Even at these concentrations, most of them are only partially effective in killing bacteria.

From these facts, it is easy to see how misuse of a preservative could result in aggravated growth of bacteria. Imagine, for example, adding half the recommended concentration of a preservative to a bucket of hard water. The resulting solution would contain plenty of sugar

for bacteria to grow in but less than the quantity required to stimulate flower opening and prevent petal blueing. It would not be acidified, so that the flowers would not rehydrate well, and the biocide would not be especially effective. Lastly, it would contain insufficient biocide to prevent bacterial growth. Obviously, this solution would be worse for cut flower performance than plain tap water!

Recommendations

- All buckets and tubs should be cleaned thoroughly before fresh flowers are placed in them. Dirt should be removed with detergent and a brush, and the container should be rinsed with 1 part household bleach to 10 parts water and allowed to drain. For preference, use white buckets - it's much easier to see the dirt (which may contain millions of bacteria) in a white bucket.
- All water into which flowers are placed should contain a biocide. Carnations and gypsophila do well in the quaternary ammonium mixture Physan20, and this is the biocide of choice if only these items are being handled. For other crops, the hydroxyquinoline salts, aluminum sulfate, or slow release chlorine and/or bromine compounds are quite effective. Most commercial preservatives contain one or other of these compounds as a biocide. You can make a simple biocide by adding 1 teaspoon of household bleach (5% hypochlorite) to 8 gallons of water (1 ml/liter). This is a very effective biocide (contains approximately 50 ppm hypochlorite), but must be replaced every two or three days.
- Use a preservative that contains enough acid to give a final pH, with your water, of 3.5-4.0.
- Use the recommended concentration of preservative when you make up your solutions. Skimping on these materials wastes your money.