



## ULTRA VIOLET ROCKS

➤ Spring and summer present terrific opportunities to incorporate some of the more unusual flower varieties that match the 2018 Pantone Color of the Year, Ultra Violet.

According to Pantone, Ultra Violet symbolizes “nonconformity” and consumers’ desire “to push creative boundaries” — notions the late rock stars Prince and Jimi Hendrix captured in their respective hits, “Purple Rain” and “Purple Haze.” Florists, too, can use bursts of this vivid color to bring new looks to their designs.

Purple flowers demand special attention. Blooms in vibrant shades like Ultra Violet may open with less intense color if harvested too early or if deprived of flower food solutions containing sugar. And, some require special care to perform well.

In addition to a slew of purple flowers available year-round (roses, hydrangeas and carnations, for example), some great Ultra Violet options have relatively short vase lives, such as anemone and ranunculus. These blooms will last longer if you **monitor sanitation** in flower buckets and coolers, **use properly mixed hydration and flower food solutions** and **adhere to cold storage temperatures** appropriate for each flower type. Generally speaking, you should only store these flowers for short periods (one to three days).

The following guidelines will help wholesale and retail florists keep these Ultra Violet blooms looking ultra radiant:

**Agapanthus**, also known as Lily of the Nile, is a landscape plant in tropical and

subtropical regions that works beautifully as a cut flower. The cut flower version has no leaves. Agapanthus petals will drop if not treated with anti-ethylene products. Holding and flower food solutions are also beneficial. Its storage temperature should be 36 to 40F.

**Allium** is a spherical flower, also without any leaves. Use a holding solution or flower food and treat with anti-ethylene products to extend vase life. Store flowers at 33 to 36F.

**Anemones** are available in a wide range of colors, including Ultra Violet. Flowers need to be treated with anti-ethylene products to prevent petal drop. Use flower food solutions and store at 34 to 36F.

**Buddleia**, or Butterfly Bush, is a fragrant landscape plant that can be used as a cut flower, but it requires special handling. Researchers at North Carolina State University have found that storing flowers in the dark increases vase life. This flower has a woody stem, so flowers should be placed into a hydration solution immediately after harvest. Placing stems in hot water (100F) and using commercial hydration solutions may accelerate water uptake and extend vase life. Flowers should be stored for brief periods at 34 to 36F.

**Liatris**, a stalk-like flower, should be treated with a holding solution or flower food at the wholesale level. Retailers should store it 33 to 35F. Liatris is not ethylene-sensitive.

**Ranunculus** is a beautiful and delicate flower available in a wide range of colors, including Ultra Violet. Use anti-ethylene products and flower food to maximize vase life and maintain flower color. Store flowers at 33 to 35F for one to three days.

For maximum vase life, **bulb flowers**, including tulips, hyacinths, crocuses and irises, need to be kept cold (33 to 34F) at all times, from harvest to sale. Use flower food specially created to reduce leaf yellowing and keep flowers fresh as long as possible.

**Statice** is a very versatile and long-lasting accent flower. For most commercial varieties, treatment with an anti-ethylene product will increase vase life. Store flowers at 33 to 35F.

**Stock** offers fragrance as well as a good vase life (eight days), if maintained at temperatures of 33 to 36F and treated with an anti-ethylene product. Using flower food and storing in clean buckets will extend flower life.

**Sweet Pea** is another fragrant flower. Pretreat it with an anti-ethylene product and use flower food for optimal vase life. Store flowers at 33 to 35F. 🌱

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**Flower School:** This month we're kicking off a 5-part series on extending flower life and maintaining flower quality.

## WATER, WATER EVERYWHERE

> Like people, flowers are mostly water, with 60 to 70 percent of each cell comprised of water. Water allows flowers to maintain normal metabolism, so they can use stored sugars for flower opening and for energy to move water up the stem. Water absorbed by cut flowers expands the cells in the petals, just as air inflates a balloon. Flower petals will open only partially if they do not have adequate water. The importance of water to flowers is often taken for granted. Just submerging stems in buckets is not sufficient.

If cut flowers lose 10 to 15 percent of their internal water supply, premature death becomes a likely possibility. Flowers lose water during shipping and storage and — when shipped long distances — can lose roughly half this amount (4 to 6 percent). Dry storage for extended periods may cause them to lose even more, **so proper re-hydration, with clean water and the right additives, is critical.** Commercial hydration and flower food solutions have a proven track record when it comes to improving flower quality and longevity. And don't forget storing flowers in coolers with high humidity (80 percent) and using clean tools will also help assure that water moves up the stem and into the leaves and flowers.

### The Science Behind Hydration

How does water move from the base of the stem to the leaves and flowers?

Water is pulled up the stem by pressure differences between the leaves and the base of the stem. As the stomata (pores) on the leaves and petals open, water is pulled up the stem in the xylem. Think of the xylem as a series of straws that go from the base of the stem into the leaves and petals. As the water runs up the stem, it moves into the cells of leaves and petals. And when you use flower foods, the cells also get a boost from sugar for extra energy and optimum flower longevity.

### Bacterial Blockage

Any blockage of the stem (xylem) restricts water uptake and lowers the amount of water that can reach the flower petals. Most commonly, the xylem is blocked by bacteria — microbes that can build up in holding or vase solutions. Microbes can collect on dirty buckets, knives and clippers or they might already be present on flower stems and leaves themselves. Commercial hydration solutions or flower foods lower the solution pH, which restricts the growth of these microbes. They also contain wetting agents to accelerate water absorption. That is why they are so effective.

### To Cut Or Not To Cut?

When flower stems are cut under water (a common practice in many floral operations), stem parts, dirt or other minute materials in the water may

also block the stem. To address this problem, researchers have developed new hydration and flower food solution technologies that increase water absorption without the need to cut stems. Wholesale and retail florists have found these new products to be effective.

If you don't use these new products, we recommend cutting 1 to 1.5 inches from the base of the stem with a sharp knife or clippers to remove dried out tissue at the base of the stem. Do not, however, recut stems underwater, since microbes and stem cells in the tank will also get sucked into the stems, thus restricting water uptake.

And please do not even consider the old practice of smashing woody stems with a hammer to expose more water-absorbing tissue! This damages the xylem in the stems and releases many fine plant pieces in the water that cause blockage and reduce water uptake.

Natural science writer Loren Eiseley once said, "if there is magic on this planet, it is contained in water." Take his words to heart. Share the magic with your flowers, and they will thank you. 🌸

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**Flower School:** This is the second in a five-part series on extending flower life and maintaining flower quality.

## KEEP IT CLEAN

> Cleanliness is a key component in flower care and handling. Flowers — and everything that touches them — should be as clean as possible for best performance. Dirty conditions in coolers, work/design rooms, buckets used for hydrating flowers and even delivery trucks translates to opportunities for disease and shorter vase life. Let's look at a cleanliness program that works for growers, wholesalers and retailers.

### Clean Water, Buckets and Vases

As we discussed last month, water is essential for flower life and flower opening. Water is pulled up the stem by a pressure differential between the leaves and the base of the stem. Microbial growth occurs when there are dirty conditions in vases or hydration containers, or if vase solutions are reused. These microbes block the flow of water up the stem. Using clean buckets with properly mixed hydration and flower food solutions will minimize microbial growth and maintain a steady flow of water up the stem. Many discussions of cleanliness end with the discussion of clean buckets. But this is just the beginning.

### Clippers, Cutters, Knives, Work Surfaces, Hands and Clothing

Microbes and disease spores collect on clippers, work surfaces and coolers. Aggressive and frequent cleaning is the

only approach that works to prevent contamination from spreading to petals, leaves and stems. Use an alcohol solution or disinfectant to clean clippers and knives and antibacterial solutions on cutting surfaces and design tables. As you'll recall from last month's column, cutting stems underwater leads to contamination quickly. When researchers cut 300 rose stems under water, vase life was reduced by 40 percent compared to stems cut dry and placed directly in properly mixed hydration solutions. And keep in mind that disease spores can reside on hands or on clothes too — so wash your hands and aprons frequently.

### Disease Spores: They're Everywhere

Disease spores are not visible to the human eye except at very high infestation levels, but they are always present and are easily dispersed in the air. Picking up flowers in the cooler may release spores into the air, onto clothing, and onto cooler benches, the floor and the walls. These disease spores may remain for at least a year, unless you remove them by cleaning. At the present time, there is no scientific evidence that air-scrubbing devices are sufficient to solve the problem of airborne contamination of disease spores, so it's key that you deep-clean your shop regularly.

### Cleanliness Checklist

Avoid flower loss and increase profits by following these recommended practices:

- Wash hands frequently.
- Sterilize cutting tools as often as you can.
- Clean and sterilize buckets between each use.
- Wash design tables with antibacterial solution several times daily.
- Remove flower waste remaining from designs and dead and diseased flowers from the processing and design area frequently.
- Cover garbage cans containing flower and plant debris.
- Sweep floors several times daily.
- Avoid underwater cutters.
- Wash walls, floors and tables/benches in coolers monthly.
- Clean the interior of delivery trucks at least weekly. 🌿

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## GO DEEPER

For additional information, read the American Floral Endowment's report "The Three C's of Success With Fresh Cut Flowers - Cleanliness," at [safnow.org.moreonline](http://safnow.org.moreonline).



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**Flower School:**  
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## PROPER FLOWER CARE FROM BEGINNING TO END

> How flowers are handled as they move from farm to consumer largely determines whether your customers get a good return on their investment in fresh flowers. Flower care protocols assure water absorption, which is necessary for both bud opening and flower longevity.

### Get Everything Ready

Clean and sanitize buckets and clippers. Fill buckets with 4 to 5 inches of the proper solution (more about this soon). Some companies perform this step the night before processing and place prepared buckets in the cooler overnight. Although warm water has been recommended in the past, recent research has shown that cold water is best for water absorption when using commercial hydration and flower foods. The primary exceptions are (1) if you want flowers to open rapidly and (2) you are working with woody stems, which hydrate best in warm water.

### Inspect Flowers

Inspect for insects and diseases on flowers, leaves and foliage. Generally, if insects are present, they will be on the underside of leaves or on the petals. Diseases most often appear on the petals or leaves as a discoloration or blackening that will generally become worse after processing. In severe cases, some diseases will exhibit white blemishes. If you see this, you should report the problem

to your supplier immediately because the damage will likely reduce the vase life or result in flowers that are not marketable. Also, look for leaves that are yellow or beginning to yellow. Color will not be restored to yellow leaves once processed.

### Hydration and Food

Flowers lose 4 to 8 percent or more of the water in the stem, leaves and petals as they are transported from farms to their final destination. Since water is critical to flower life and opening, the lost water must be restored.

Commercial hydration solutions and flower foods are designed to extend flower longevity and to promote flower opening. And they work! So, what is the difference in these solutions and when should they be used?

Hydration solutions and flower foods contain many of the same ingredients (possibly at different ratios and concentrations). The difference is that flower foods contain sugar and hydration solutions do not. Hydration solutions are used generally by wholesale florists to provide quick absorption of water. Once hydrated for two to four hours (according to label directions), flowers can be moved to a solution with flower food to provide energy needed to move water up the stem and to expand petals as the flower opens.

Each solution lowers the water pH, which reduces growth of microbes that may block the flow of water up the stem.

The pH of the final solution should be 3.5 to 5. Suppliers of hydration and flower foods can analyze your water and assist in getting the optimum pH.

Some consider these professional products to be too expensive, despite the fact that the price breaks down to less than a penny per stem. We do not hesitate to spend a dollar or more to buy a soda or bottled water to quench our thirst. Shouldn't the costs to rehydrate flowers be equally important?

Finally, remove the leaves that will be below the solution when cut and remove 1 to 1.5 inches from the stems with a sharp, clean knife or cutter, unless you are using one of the newest hydration and flower food solutions, which do not require stem cutting.

### Keep Flowers Cold

Cold temperatures reduce respiration (use of stored sugars), minimize the sensitivity of flowers to ethylene and lower the internal production of ethylene. Storing flowers in a cooler maintained at 34 to 36 F will extend flower life. Once flowers have been placed in a properly mixed solution, move them to the cooler, unless flowers need to be opened promptly.

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**Flower School:**

This is the fourth in a five-part series on extending flower life and maintaining flower quality.

## ETHYLENE: PUBLIC ENEMY NO. 1

> Ethylene can quickly shorten flower life and even destroy flowers. Common effects of ethylene exposure include premature wilting; flower, bud and leaf drop; and premature death. Recent research attributes bluing, bent neck and leaf wilting in some varieties of cut roses to ethylene. Symptoms of ethylene damage vary by flower type and variety; regardless of what it looks like, it unleashes significant losses to the floral industry.

The good news? Today, there is no reason to experience ethylene damage or death, thanks to specialized treatments to prevent it.

### Where Does Ethylene Come From?

Ethylene is a naturally occurring plant hormone that is odorless and colorless. Ethylene damage occurs at very low concentrations (one part per billion or less). There are two common ways that flowers become exposed to ethylene:

**1. Presence of atmospheric ethylene in coolers, shipping containers or retail facilities.** Ethylene gas is a natural byproduct from plant and flower debris, dead and dying flowers, combustible engines and fruits and vegetables. These gases can build up in any closed area.

**2. Presence of internally produced ethylene.** Stress caused by temperature, water, vibration and mechanical damage triggers the internal production of

ethylene in flowers and plants. Our products become more sensitive to ethylene as they age, or at warmer temperatures.

Today, there may be more damage from stress-produced ethylene than from atmospheric ethylene. Why? Because of shipping conditions. Flowers grown in one part of the world are often shipped long distances to other markets, exposing them to vibration, temperature fluctuations, and water stress during the extended journey — all triggers for ethylene production. Then, if they're stored for a long time, the aging flowers become more susceptible to ethylene.

Atmospheric ethylene is less of a problem because the industry years ago recognized the need to discard old flowers and avoid storing flowers in the same cooler with fruits and vegetables. It is less common to measure ethylene in wholesale and retail floral coolers today, as doors are opened frequently and the turnover of flowers is rapid. As a result, ethylene scrubbers (equipment that removes ethylene from the cooler) may be less necessary today than in the past.

### Minimize Ethylene Damage

There are three ways to eliminate or reduce damage from ethylene:

**Grow or purchase varieties that are not ethylene-sensitive.** Some varieties simply do not have genes that are sensitive to ethylene. Ask your suppliers for

recommendations rather than trying to guess. Neither color nor fragrance has any correlation to ethylene sensitivity — a common misconception!

**Use flowers that have been treated with anti-ethylene products.** Effective anti-ethylene products include silver thiosulfate and 1-Methylcyclopropene (1-MCP). Commercial products containing these ingredients are readily available from postharvest care and handling companies and are easy to use. Once treated, flowers are protected from both atmospheric and internally produced ethylene.

**Cold temperatures.** Flowers are much more sensitive to ethylene at warm temperatures. Keeping flowers cold provides greater resistance. For all nontropical flowers, the storage temperature should be 34 to 36 F.

It's as easy as that! Help improve your brand's reputation (as well as the industry's!) by taking steps to avoid damage. Choose resistant varieties, purchase ethylene pre-treated flowers, maintain flowers at cold temperatures, and avoid all sources of ethylene. 🌸

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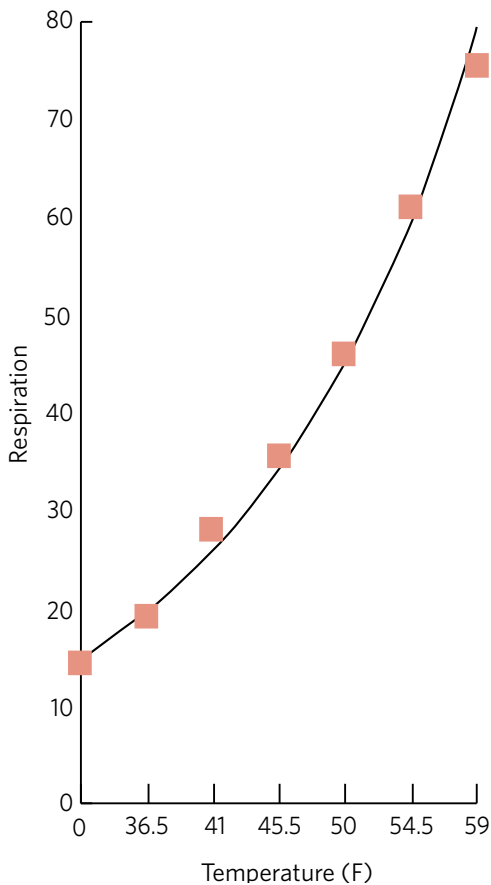
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**Flower School:**  
This is the fifth in a five-part series on extending flower life and maintaining flower quality.

## CHILL OUT: THE IMPORTANCE OF KEEPING FLOWERS COLD

> In the floral industry, there's increasing recognition of the importance of cold temperatures — and providing cold temperatures for every flower from the point of harvest to the point of sale. (One notable exception to this rule: tropical flowers.) And, just for clarity, "cold" means 34 F to 36 F.



Why is the cold so important? Low temperatures extend vase life and optimize the performance of cut flowers. Moreover, cold temperatures are easily managed by adjusting the thermostat and monitoring the temperature in the cooler. Sounds simple enough, right? In theory, yes, but in reality, and for various reasons, it is not unusual to observe flower shop coolers at 42 F to 45 F. Those higher temperatures reduce flower life, which can lead to disappointed customers.

Why does cold temperature have such a big influence on the performance of flowers? Three factors help explain the science.

### Respiration

Flowers use stored sugar and starch to maintain the structure and function of cells in the flowers, leaves and stems. Sugars provide the energy for flowers to open and to extend flower life. Without sugar, cells starve, blooms fail to open, and death occurs prematurely. Cold storage temperatures lower the respiration rate and allow sugars to be conserved. See the graph for an illustration of how rapidly consumption of sugars and starch increase as temperatures rise. Flower foods provide sugar to supplement the stored sugars used by the flower during storage, shipping and handling.

### Ethylene

Ethylene kills flowers. At cold storage and shipping temperatures, however,

flowers are less sensitive to atmospheric ethylene and do not produce as much ethylene internally. In fact, flowers are 1,000 times more sensitive to ethylene at 65 F than they are at 35 F.

### Diseases and Microbial Activity

Spread of diseases such as botrytis on flower petals and growth of microbes in bucket and vase solutions are reduced significantly at cold temperatures. Botrytis spores grow and destroy flowers rapidly at warm temperatures. These spores are not killed by cold temperatures, but the spread of the disease is much slower. Microbes block the flow of water up the stem. Microbes present in bucket and vase solutions grow much faster in warmer water.

Realizing how cold temperatures affect respiration, ethylene and disease makes it possible to extend the life of flowers. But temperature is only one of the key factors in flower life. Equal priority needs to be placed on the other factors affecting the absorption of water, particularly scrupulous sanitation, ethylene management and the use of properly prepared hydration and flower food solutions. 🌿

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**H2O Life:**  
This is the first in a two-part series on water quality.

## WATER QUALITY AND CUT FLOWER LIFE

> Cut flower processing done from farm to consumer always involves water as a medium to deliver necessary ingredients. The quality of water that you place your cut flowers in has a profound effect on how your flowers are going to perform. Understanding water quality will help you improve the look and performance of your flowers. It's essential knowledge to get the best return on investment from the postharvest care products you use.

Several aspects determine the quality of water: physical properties (mostly water temperature and any particles suspended in water), chemical properties (what other chemicals are dissolved in water) and biological properties (microbes or any other living matter). This article will focus on the chemical properties.

### Water pH

The pH scale is a measurement of acidity or alkalinity of water. The pH scale ranges from 0 to 14, with a pH of 7 being neutral, a pH below 7 considered acidic and a pH above 7 considered basic or alkaline. The pH scale is such that a change in 1 pH unit equals a tenfold change in the acidity or basicity. The natural pH of water used for cut flowers could vary from 5.0 to 9.5, depending on the source of water and any other processing it has undergone. The pH of water dictates many chemical reactions, but for cut flowers, the most important implications are the speed of water uptake and the performance of flower food you add to the water. Numerous research studies have shown that cut flowers take up water fastest if the water pH is between 3 and 5. This is acidic water. Almost all cut flower food products contain "acidifiers"

to ensure the water pH is brought down to that pH range for best performance.

### Water Alkalinity

The initial pH of your water offers only a limited snapshot of water quality. You also want to know alkalinity, which is also described as the buffering capacity of water. Caused by salts dissolved in water, it is a measurement of resistance of water when an "acidifier," such as flower food, is added to lower the water's pH. Alkalinity is typically measured in parts per million (ppm). The higher the alkalinity, the more resistant the water to a pH change. Typically, water with alkalinity in the range of 60 to 180 ppm works well with flower food.

If the water you use has extremely high alkalinity, you have two choices. Some flower food companies sell specific versions of flower food compatible with extreme alkalinity. Or you can purify water to remove alkalinity (deionization or reverse osmosis system) before processing cut flowers.

### Water Hardness

The level of hardness refers to the amount of calcium and magnesium ions in your water (measured in ppm). If your water has high alkalinity, chances are that the water has high hardness too. As with any other living thing, flowers don't do well with very high levels of these chemicals. The most common method of getting rid of hardness in water is to use a water softener. A typical water softening process replaces calcium and magnesium ions with sodium ions. Unfortunately, too much sodium also is not good for cut flowers; therefore, "soft-

ened water" is not recommended for use with cut flowers. There are water softening units that use potassium rather than sodium, which would be better for cut flowers as high potassium levels are less harmful than sodium.

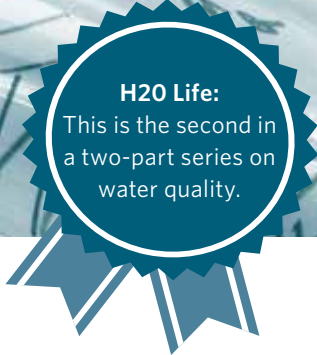
### Total Dissolved Solids

The total dissolved solids (TDS) is a measurement of all the dissolved solids in the water (typically measured in ppm). It is essentially the level of salts in the water. Similar to any other living thing, cut flowers cannot handle too much salt. Research has shown having some salt in water is good for cut flower quality, so a healthy balance of salts is the best way to go. There are other specific chemicals, such as iron and fluoride, that can be harmful for specific types of cut flowers at low concentrations, so we need to keep an eye on those too.

### How to Measure Water Quality

There are simple test kits available to measure these water quality parameters. Search online or check with a retailer that supplies tools for pool maintenance. If you want a comprehensive analysis, you could send a sample to a lab. Also, some flower food companies will evaluate your water for free and make flower food recommendations. 🌿

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## THE BIOLOGY OF WATER

➤ Last month, we discussed the chemical components of water that affect the postharvest quality of cut flowers. In this article, we will focus on water's biological properties that play a key role in maintaining an uninterrupted supply of water to a cut flower.

### What Are Microbes?

The biological property that most impacts the quality of cut flowers is the presence of microbes. Microbes are microscopic living organisms such as bacteria, viruses, fungi and algae. Microbes live in every environment, including in and on our bodies.

While some microbes benefit humans and plants, many can cause damage and disease. The microbes associated with cut flowers after harvest do more damage than good. Invisible to the naked eye, microbes are difficult to detect and thus are difficult to control.

### GO DEEPER

Read the first part of this water quality series at [safnow.org/moreonline](http://safnow.org/moreonline).

Have a care and handling question you want Floral Management to field? Email [fmeditor@safnow.org](mailto:fmeditor@safnow.org) and we'll put your biggest quality challenges in front of the industry's top experts.

The microscopic size of these organisms makes it impossible to determine how many microbes are present in water. Microbes multiply very rapidly, and can reach damaging levels very quickly — if preventative measures are not taken.

### Microbes and Cut Flowers

Bacteria and fungi (mostly yeast) are the most common types of microbes that affect the life of cut flowers. The number of these organisms in your water is more important than the type of microbe.

Scientific experiments have shown that, when the number of microbes in water (especially bacteria) grows beyond a certain threshold, they begin to populate the small vessels (called xylem) that carry water within the cut flower stem. When bacteria, both living and dead, block the xylem vessels, flowers cannot receive water and eventually die from dehydration.

### How to Keep Water Clean

A few practical steps can prepare your water for cut flower processing and reduce the risk of microbial contamination. General cleanliness and routine sanitation of your facility is essential to maintain the quality of cut flowers. The goal of preparing a clean environment is not to have sterile water but to keep the microbes from reaching damaging levels.

First, start with a clean container to hold water. A clean bucket and clean tools will ensure that the initial microbe level is minimal. It's a good habit to routinely use a commercial cleaner and a disinfectant to sanitize containers.

Second, use an inexpensive test kit to check the microbe levels in your water. An example is the Sani-Check test kit for bacteria from Biosan Laboratories Inc. in Warren, Michigan ([biosan.com](http://biosan.com), starting at around \$100). If you use municipal drinking water, the microbe levels are most likely low. Furthermore, using commercial treatments for cut flowers in proper dosages should keep water clean.

### Vital Tasks

Remember, understanding the amount of microbes in your water is vital for getting the best postharvest quality of cut flowers. Routine checks and sanitation practices will help prevent the microbes in your water from reaching damaging levels. 🌿

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## COOLER UPKEEP: KEY TO FLORAL BUSINESS SUCCESS

> Display or walk-in, brand-new or decades old, the cooler is arguably the most vital tool to the floral professional's success. If you've ever faced a big wedding or Mother's Day when your cooler threatened to quit, you know the dread of wondering if your business will survive the weekend. You should also know the value of proper cooler selection, cleaning and maintenance.

### Choose Wisely

There are two primary types of floral cooler: display and rotational. A display cooler is used to interact with and sell flowers to the customer. A rotational cooler is used to store flowers during processing. For practical purposes, use a rotational cooler before and during production and a display cooler when merchandising the finished product.

A display cooler has a customer-facing surface, often featuring glass doors. Every time an access door is opened, it creates a fluctuation in temperature. This, in turn, may reduce the vase life of your product.

A rotational cooler has ample space for storing and holding flowers at various stages of production. Often a "walk-in" structure, it has a large door that remains closed for longer periods of time, maintaining a more consistent temperature that preserves flowers more effectively.

### Temp Matters

It's important to recognize the difference between a thermometer and a thermostat. Most coolers have a thermostat placed outside the unit (near the door, so you can keep an eye on it). You program it to the desired temperature for the air surrounding your product. Keep in mind, however, that it does not measure the actual temperature in the cooler, which varies every time you open the door.

To more accurately measure the cooler's static temperature, place a container of water inside and measure the water's temperature. Fluid temperatures fluctuate much more slowly than air temperatures and will be less affected by door traffic.

Remember, keep your cooler temperature in the range of 34 to 38 F (2 to 3 C) with a relative humidity of 75 to 85



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percent. Tropical flowers prefer balmier temperatures (53 to 55 F).

### Cooler Maintenance

You may not be a refrigeration technician, but you have a tool at your disposal that will go a long way in ensuring your cooler enjoys a long and happy life. That "tool" is a regular cleaning and disinfecting program.

Florists' common enemies are fungal and bacterial colonies that harm flowers directly, but also generate ethylene gas, which reduces vase life. A major source of ethylene: dead and dying flowers. One tool for combatting mold, fungus and ethylene is a strict inventory protocol known as FIFO, or First In/First Out. That is, use the oldest flowers first. If they aren't used, dispose of them so they don't sabotage the healthy stock.

To further combat the harmful elements in your cooler, regularly sanitize every surface and tool. Your weapon of choice should be a floral sanitizing solution that disinfects, cleans and deodorizes containers, tools and work surfaces. The cleaner to avoid is chlorine bleach. While bleach does effectively kill bacteria and fungus, its effects are short-lived.

In contrast, floral sanitizers work on contact and keep working. One potential drawback is that they may leave a film on glass surfaces. If this is the case, you may need to use a glass cleaner on your display windows and doors.

### Calendar Skills

It helps to develop a program to ensure certain tasks aren't neglected. Here's a helpful list:

- Sterilize cutting tools as often as you can.
- Clean and sterilize buckets between each use.
- Wash design tables with an antibacterial solution several times daily.
- Remove flower waste remaining from designs and dead and diseased flowers from the processing and design area frequently.
- Cover garbage cans containing flower and plant debris.
- Sweep floors several times daily.
- Avoid underwater cutters.
- Wash walls, floors and tables/benches in coolers monthly.

Don't forget coils. They cool the air and remove humidity, and they must also be cleaned and maintained.

Finally, consider drainage. Whether your cooler has a floor drain or a drip pan, it becomes a potential breeding ground for bacteria and fungus if not cleaned frequently. 🌿

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## A PRIMER ON SUMMER BLOOMS

> Believe it or not, summer is coming. Warm weather will soon be here, and with it will come a wonderful array of locally grown cut flowers. Many of these colorful species are long lasting and will give you something new to work with in your designs. Here are a few of my favorites.

**Coneflower** (*Echinacea*) is hot right now, with dozens of new varieties available with colors ranging from white to pink, purple, yellow and orange. Coneflowers are available from mid- to late summer and have a medium to long vase life (seven to 10 days, or even longer). Select flowers that have fully opened and colored petals. Flowers with a green tinge on the petals are likely old and should be avoided. Flower heads with the petals removed make interesting cuts and might be an option for flowers with damaged petals.

Following hydration, use a commercial flower food with sugar. Flowers should be stored for one week or less before selling. Coneflowers do not appear to be sensitive to ethylene or anti-ethylene agents.

The trendy **dahlia** is the queen of the summer flowers with its lush texture and wonderful colors. The dahlia's vase life tends to be short, but you can expect flowers to last at least a week if properly handled. Select flowers with two or more outer rows of petals fully expanded. For some cultivars, if you use a flower food containing sugar on buds just starting to open with only a few petals showing color, you can enjoy a vase life of more than 10 days.

Hydrate with water or a commercial hydrating solution and hold in a flower food with sugar, which will increase vase life. Storage decreases the vase life of dahlias, so use the flowers as soon as possible. Dahlias are not affected by ethylene.

Once relegated to the flower bed, the **marigold** has surged in popularity as a cut flower, especially for Latino and Southeast Asian communities. Select flowers that are about 50 percent open, as they will open further during use. The bright yellow and orange flowers attract attention, but some people don't like the



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fragrance of marigolds' foliage. Handle stems carefully because the base of the flower is hollow and heads can break off.

Marigolds can last for more than two weeks but will generally hold up for seven to 10 days. Hydrate flowers with commercial hydrators. Commercial flower foods will increase vase life, while floral foam will reduce vase life. Marigold stems can tolerate two weeks of dry storage at 33 to 35 F. Stems actually store a little better dry than in water. Ethylene does not affect marigold flowers.

**Rudbeckia**, also known as the black-eyed Susan, has the color palette of sunflowers, but is easier to use in small arrangements and bouquets due to its thinner stems. Petal color ranges from yellow or orange to a bronzy red, and the center cone can be black, brown or green. Bi-color and double-flowered cultivars are also available. Select flowers with outer petals fully expanded. A small percentage of flowers will wilt and do not rehydrate. (The grower should have removed those before selling to you.)

Rudbeckia's vase life can be long — more than two weeks. Hydrate with water or a commercial hydrating solution. Using flower foods with sugar will increase the vase life of some cultivars. Floral foam has no effect on rudbeckia, nor does ethylene. Stems could be stored at 33 to 35 F, either dry or in water.

If dahlias are the queen of summer flowers, then **sunflowers** may be the king. These classic summer and fall flowers come in a variety of colors — both

in their petals and centers. The beloved orange cultivars with chocolate brown centers are the most popular. But petal color can range from very pale yellow or green to a deep bronzy red with all shades in between. The center florets can be brown or green. For something different try those with twisted petals or one of the new nearly white varieties. Everyone agrees that the pollenless varieties are the best to use — they have a longer vase life and you don't have to worry about pollen staining anything.

Select sunflowers with petals perpendicular to the head. Their vase life often is determined more by leaf yellowing or desiccation than by flower problems. Newer sunflower cultivars have more than one row of petals, and thus the loss of a petal or two won't be noticed. Red or bronze cultivars have a tendency to drop petals prematurely.

Sunflowers' vase life can be up to two weeks but is generally seven to nine days. Hydrate with water or a commercial hydrator. Flower foods with sugar increase vase life of most cultivars by two to three days. Sunflowers can safely be stored at 33 to 35 F for up to a week. 🌻

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