handle with care

By Bruce Wright

In the first column of our new care and handling series: a look inside the stem of a cut flower.

Why should you care about handling?

There are two reasons why it's worthwhile spending extra time and money to make sure cut flowers last longer.

One, good care and handling procedures will save you money and boost your profits. "This isn't just something you want to do because it's the right thing," says W. Kurt Schroeder AIFD, AAF, PFCI, of WKS Associates in Deptford, New Jersey, a floral-industry consultant and an expert on postharvest care. "This is something you do because it's a key strategy to insure your survival as a business."

In the current economic climate, most florists are looking for ways to cut costs. How many ways are there to cut costs that not only don't compromise quality, but that actually guarantee higher quality in the products that leave your shop?

"After you've cut and carved and downsized everywhere else, controlling your perishables is one of the best means available to help you be more profitable," says Kurt. "Everybody talks about the cost of flower food, of paying someone to clean buckets. But if you reduce replacements and shrinkage by just a little, care and handling will more than pay for itself. It should be considered as, not a cost, but a profit saver."

Kurt believes most florists throw out 8% to 15% of what they buy in. "They will tell you, 'No, I hardly throw out anything.' But this is the average—8% to 15%. If you can shave even two or three percent off of that, you have considerable savings. Calculate this amount in relation to your annual cost of goods sold for fresh flowers, and you'll see that the amount you save more than pays for the expense of the labor and materials involved."

Two, the benefits in terms of reputation and customer loyalty are incalculable. "Think about it," says Kurt: "when customers compliment you on your flowers in a big way, is it generally about how beautiful something was, or about how long something lasted in their homes? It's the latter that makes an indelible impression, the kind that people talk about and that keeps them coming back."

IT'S SAD BUT TRUE: from the moment a flower is cut, it begins to die. Still, at that moment, it is still gloriously alive—capable of continuing its life cycle by drawing moisture and nourishment from the cut end of its stem up to the bloom, which can develop and flourish if the right conditions are met. Of course, our job as florists is to meet those conditions: to prolong the flower's life as long as possible.

Most florists know the basic rules for how to do this: what to do to keep fresh cut flowers alive. What we'd like to do in this first installment of our new care and handling column is go a little more deeply than usual into why these strategies work—and why, occasionally, they don't. What are the biological and chemical facts behind the "rules" that will help you follow them with sound logic, flexibility, and most of all, consistent results? It begins with understanding "care and handling" from the flower's point of view.

Clean pipes

We all know that plants draw water mixed with nutrients up into themselves from the earth. That's amazing! What's even more amazing is that plants draw only what they need—water mixed with just the right minerals and other elements to help the plant maintain the right pH and perform photosynthesis and other functions.

"Before the flower is cut, the roots are a filtering system," explains Gay Smith, technical consulting manager for Chrysal Americas, the supplier of postharvest care and handling products. "It's not perfect—sometimes a virus or bacteria get through, and a stem flops over. But generally speaking, it works quite well."

With the roots taken away, what remains are the specialized cells within the plant stem that conduct water and nutrients from the soil up to the leaves and the flower. It helps to understand a little about these cells. Given their function, it's not surprising that they are pipe-shaped: long, with a very narrow diameter. These long cells are connected end to end in even longer tubes. "You can think of them as very narrow drinking straws, bundled together. That's basically the way a stem is," says Gay.

"And every inch or so, between those vertical columns, are semipermeable cell plates that help to reduce or keep out any kind of foreign matter," she continues. "These cell plates are the only reason why, if you put a flower in water that has bacteria in it, the bacteria won't move all the way up; 98% of it lodges in the bottom." The problem is that without the filtering system of the roots, the cell plates easily become so clogged—with debris, bacteria, or air bubbles—that the movement of water and nutrients is impeded.

"That's why it's so important to recut one to two inches from the stem whenever it's been out of clean water," says Gay. "Everybody's been guilty of giving that micro cut on a stem. With flowers, the longer the stem, the higher the price. But you need to cut off at least an inch to make sure you've eliminated the stuff that was stuck in the bottom."

Grace under pressure

What makes the water and nutrients move up the stem? The same thing that keeps the stem, and the leaves and blossom, turgid (firm) rather than floppy: turgor pressure. The walls of plant cells are not inherently rigid, but flexible; the only reason the stem of a cut flower stands upright is that it's full of water. As water evaporates from the leaves and the blossom and all the top cells of the stem, it creates a powerful natural pressure, like a vacuum.

This pressure is enabled by the specialized structure of the cells. It's so powerful that, from the moment you cut a stem, that cut stem end is sucking against gravity, looking to pull in water. "You have between one and ten seconds

to get it into hydration solution or flower-food solution—or at the very least, clean water," says Gay. "Because if you don't, it will suck in air and whatever else is around it—and there are always plenty of bacteria all around us."

On average, when a flower rehydrates after being shipped dry and then being recut, about 70 percent of the hydration takes place within the first hour. This is why the first drink is so important. "If the flower gets filled up with tap water the first time, or dirty water, you're kidding yourself," notes Gay. "Bacteria exert enormous pressure on successful uptake by impeding flow across the cell plates and blocking the internal filtering system."

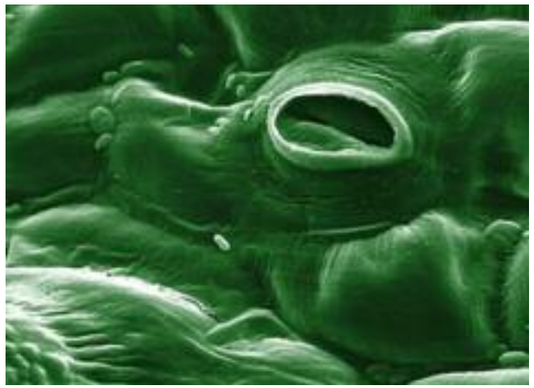
Underwater cutters, which became popular in the '90s, in theory get around the problem created by turgor pressure by immersing the stem in water while it's being cut. The challenge is to keep that water from becoming contaminated with bacteria as cut stems "bleed" bacteria and enzymes during the cutting process. The water needs to be changed frequently and the tank and blades sanitized.

Make no mistake: turgor pressure is a good thing. Without it, the flower wilts, as moisture is lost to the air. One of the factors that keeps turgor pressure going is a kind of specialized cell found on the underside of the leaves of most flowering plants, called stomata. The stomata open and close in relation to the microenvironment around the leaf, whether it is moist or dry, light or dark. "All plants are constantly trying to stabilize the amount of water vapor inside and outside the plant," says Gay. "But the action of the stomata is particularly noticeable in certain flowers, like roses. That's why we recommend to leave as much foliage as possible on roses at least until the stems are full of water again after they've been recut." (They become firm with turgor pressure, "hardened off.") The stomata help the stem draw in water from its cut end.

Sugar cravings

In nature, plants manufacture sugar through photosynthesis. Sugar is an important part of the chemistry of plant cells. "The cycle of photosynthesis is about taking light and oxygen and water and turning it into starches and sugars," Gay reminds us. "When the flower is cut, photosynthesis is much reduced. So you need to replace that sugar." This is why flower foods contain sugar. They also contain clarifying agents and acidifiers, to keep the water clean and to lower the pH.

Most cut flowers are harvested before they have reached full maturity. They require energy to continue the process of opening, developing color and fragrance. If that energy isn't provided by photosynthesis, it must be provided through replacement sugars.



Why do rose stems hydrate more efficiently if at least some of their leaves are left on the stem? Because of specialized cells called stomata (pictured in the microscopic photo above) that help the rose plant regulate its moisture content.

Some flowers continue to grow after they have been cut. Tulips, gladioluses, and snapdragons are among the best-known examples. Because they grow in a direction against the pull of gravity or towards the light, or both, their growth is evident in twisted and angled stems. In others, growth stops or slows way down—but the cells at the top of the stem, just under the flower head, remain the youngest and weakest cells. They are the most vulnerable to any obstruction in the flow of water and nutrients inside the stem—hence the phenomenon of "bent neck" in roses and gerberas, which occurs, not because the flower head is heavy, but because the cells just below it are the most immature.

Acid test

Two other factors to be aware of in the life of a cut flower are pH and hormones. "The pH of tap water is too alkaline for good movement of water through cells," says Gay. Lowering the pH does two things: It dissolves air bubbles inside the water column in the stem, and it improves the action of the biocides that kill bacteria in the water. Air bubbles and bacteria are the two big stem blockers—so pH is critically important. This is why flower foods generally contain an acidifier, either citric acid or aluminum sulfate.

In plants as in animals, hormones act as the triggers that govern all metabolic processes: "They are the guiding light, the triggers that turn changes on and off," says Gay. Hormones cause buds to bloom and leaves to color and fall—or in the case of certain cut flowers, to turn yellow. Treatment with synthetic hormones can reduce leaf yellowing and extend vase life in flowers like gladiolus and alstroemeria. Ethylene is the mother of all plant hormones, the one that accelerates ripening and aging, wilting and dying—the very processes that, as florists intent upon prolonging the beauty of our products, we seek to slow down.

Bulb flowers, in general, seem to be more sensitive to hormones as cut flowers than others. Indeed, when it comes to physiology, cut flowers have many things in common—but not all. Some flowers have special needs.

More on that in the next issue—and on the first, maybe the most important step in care and handling: how to make sure you are buying the best possible quality for your shop.

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