

End-of-August Farm Update + Beating Biofilm + More!



Crop culture and commentary for fresh-cut flower growers

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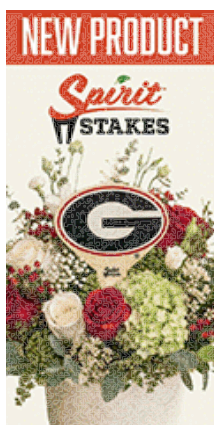
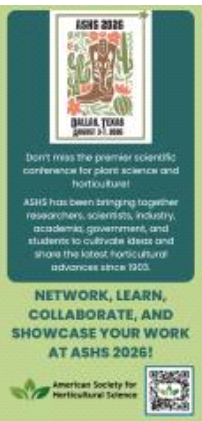
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COMING UP THIS WEEK:

End-of-August Farm Update
New Sustainabloom
Resources
Beating Biofilm: It's a System
- How Nanobubbles Help
Trying My Hand at Design



End-of-August Farm Update





Sneak peek at some of the signature bouquets we made last week with our summer favorites.

It's hard to believe we are already nearing the end of August. The days are getting noticeably shorter, the mornings are a little cooler, and there are subtle reminders around the farm that fall isn't too far away. Signs include morning dew ... and the first onset of powdery mildew on the first succession of zinnias.

But if you visited us right now, you wouldn't think the season was slowing down. August has brought some of the biggest harvests of the year. Our two acres of dahlias are finally hitting their stride, lisianthus continues to fill the coolers, and many of our other summer favorites are keeping our crew busy from morning until evening. This is the time of year when months of planting, watering, weeding and waiting finally pay off. There is something incredibly satisfying about seeing the farm overflowing with flowers after months of careful planning and daily diligence. I will never lose my enthusiasm for this!

Behind the scenes, we're also beginning to turn our attention toward what comes next. Even as the days get shorter, we're gearing up for some bigger projects around the farm, plus Valentine's Day. There will be plenty of cleanup, bed preparation and fall planting. But we're also getting ready for a few construction projects that will help us continue growing and improving the farm for years to come. There's a lot happening that Tater and I aren't quite ready to share yet. But we're very excited about where things are headed. We're in this for the spring, not the marathon and this year we are going to continue laying a strong foundation for our farm.

As we head into the final stretch of the season, I keep reminding myself that this time of year is a little like the last few rounds of a sparring match. We're tired, the days have been long and there is still plenty of work ahead. But we've already made it through so much and a knockout win for the season is in sight. Before long, the pace will slow. The coolers will empty and we'll have a chance to look back at everything we accomplished this season. Until then, keep putting one foot in front of the other. Take care of yourself and your team and remember: we're in the home stretch!

In this edition of *Bloom Beat* we're talking AFE Sustainabloom resources, nanobubbles and more. With all that being said, let's talk shop!



New Water Conservation Resources from AFE & Sustainabloom



Water conservation is becoming more important to us at Forget Me Not. Our area continues to see industrial and commercial expansion. Some of those industries requiring significant amounts of water (millions of gallons per day), which has forced me to think much more seriously about our own water use. Water is the cornerstone to any successful farming operation, so the possibility of increased demand or someday having less water available means we need to become more intentional about how efficiently we use water and making sure we have multiple alternative sources. Water conservation isn't just an environmental conversation, it's also about protecting the long-term resiliency and viability of our farms.

Earlier this month, Tater and I had the opportunity to host a webinar for the Association of Specialty Cut Flower Growers with our friends at the American Floral Endowment (AFE). Our friend Laura Barth from AFE shared some new resources available through AFE's Sustainabloom program, and I immediately knew I wanted to pass them along to you.

For those of you new to Sustainabloom, it was created by AFE to make sustainability information practical and approachable for businesses throughout the floral industry. If water management is something you're thinking about on your farm, I would bookmark these pages for off-season reading.

One of the best resources Lara shared is the new Sustainabloom Water Conservation Guide. This resource walks you through assessing, planning and implementing conservation practices. Existing irrigation infrastructure, return on investment, regulations and the crops being grown all influence which improvements make sense for your operation. This [TEMPLATE](#) helps you make informed decisions and create strategies for better water management.

Another concept worth exploring is your farm's water footprint. We think about water conservation as fixing leaks, switching irrigation methods and capturing rainwater. But your water footprint is more than

that. Your water footprint provides a broader way of looking at how much fresh water a farm actually uses. It can include direct water consumption as well as water associated with the products and services that support your farm. Understanding that footprint can help identify where conservation efforts may have the greatest impact.

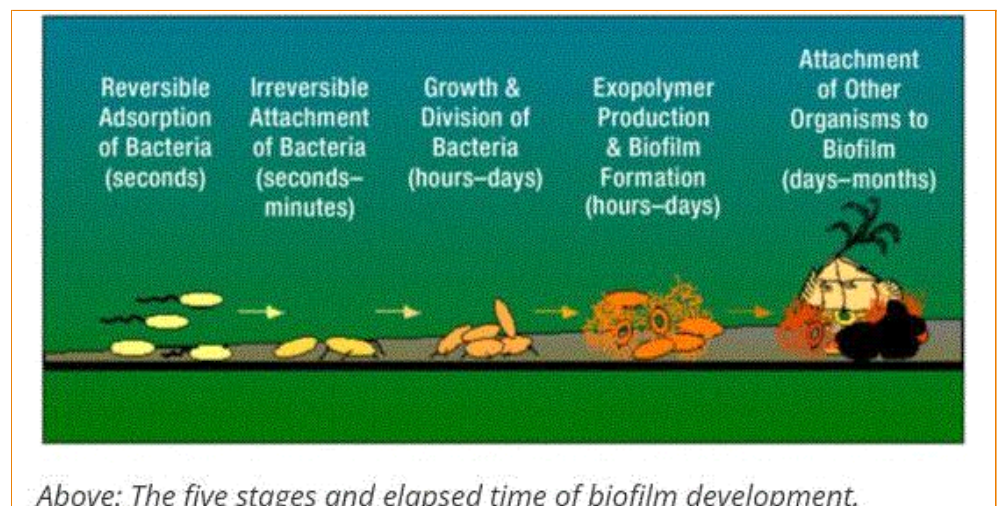
Laura also introduced us to the [World Resources Institute's Aqueduct Water Risk Atlas](#). I think it is particularly interesting for growers. Aqueduct uses open source, peer-reviewed data to help users understand water-related risks around the world. (It's a great way to break up your doomscrolling one night.) The Water Risk Atlas allows you to explore current and future risks by location. Factors include water stress and drought. We need to make decisions about infrastructure that may be used for decades, understanding not only today's water situation but potential future risks can add another layer to long-term planning and building a resilient flower farm.

The biggest takeaway for me is that you don't have to overhaul your entire irrigation system tomorrow to start thinking more seriously about water conservation today. Begin by understanding where your water comes from, how much you're using, and where you may be losing it. Consider whether capturing or recycling water makes sense for your farm. And before making a major investment, spend some time understanding the water risks specific to your location.

Water is one of those resources that's easy to take for granted when you have it. However, nearly everything we produce depends on reliable access to it. Becoming better stewards of the water available to us isn't just about sustainability, it's about making sure our farms are prepared to keep growing in an increasingly water-conscious future.



Understanding Biofilms in Ornamental Production



Graphic courtesy GrowerTalks Magazine.

As droughts and infrequent rainfall become more common, rainwater catchment is an alternative source of water that we rely on at our farm. We are constantly trying to improve our irrigation efficiency and optimizing our alternative water sources on our farm.

Rainwater catchment can be incredibly valuable, but it also require us to think differently about water quality. Stored rainwater, tanks, irrigation lines, organic debris and warmer water temperatures create favorable conditions for microbial growth and biofilm.

What is biofilm? Biofilm is a living community of microorganisms protected by a layer known as an extracellular polymeric substance (EPS matrix for short). Also known as “bioslime,” this protective material is made up of polysaccharides, proteins, lipids, DNA and other organic compounds. Think of the EPS matrix as a living shield surrounding microorganisms. It traps nutrients, protects the organisms living within it and can make them considerably more difficult to reach with sanitizers.

At Cultivate, Justin Leavitt from Molear Inc, discussed why growers should stop treating biofilm with “Band-Aid” solutions and instead think about water quality as a system. Water quality starts from the source and storage tank all the way to the emitter delivering water to the crop.

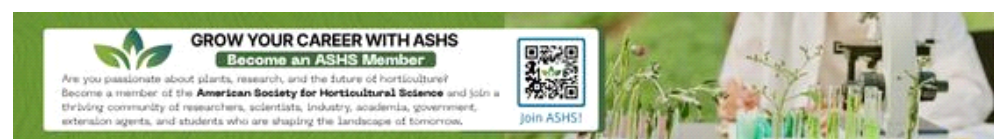
According to Justin, biofilms develop through a relatively simple lifecycle. Free-floating microorganisms find a suitable surface and begin to attach. Once established, they produce the EPS matrix and adhere more firmly to surfaces such as the inside of irrigation lines and storage tanks. The colony continues to grow as more microorganisms become established. Eventually pieces can break away and travel through the irrigation system, potentially establishing new colonies elsewhere, exacerbating the problem.

This is one reason why treating incoming water doesn't necessarily mean the entire irrigation system is clean. This [ARTICLE](#) from *GrowerTalks* makes an excellent analogy: Putting clean water into a contaminated irrigation system is a little like washing fresh lettuce, then putting it on a dirty plate. Even if source water has been treated, microorganisms established farther downstream in tanks and irrigation lines can potentially re-contaminate that water before it reaches your crop.

The effects of biofilm aren't limited to water sanitation. Biofilm can contribute to clogged emitters, inconsistent irrigation and reduced flow capacity. This results in a poor finished product. When some plants receive more water than others, crop uniformity suffers. You might even see a stairstep effect in the bed. But the goal is to catch these problems before it gets to this point. As a result, your staff spends additional time finding problem emitters and troubleshooting the whole irrigation system.

Granted, these can seem like small jobs, but collectively they quietly become a significant labor suck. During the busiest weeks of the growing season, another clogged emitter or section of uneven irrigation is the last thing you need!

Biofilm also consumes oxygen within irrigation water. The *GrowerTalks* article notes three important consequences associated with biofilm: reduced dissolved oxygen available to crops, the potential movement of microorganisms to plants through irrigation water, and emitter clogging.



Biofilms (Cont.)

More concerning is biofilm's ability to provide a protected environment for plant pathogens including Pythium, Phytophthora and Ralstonia. It's important to think about water sanitation and disease management as separate problems. Justin encouraged growers to recognize that biofilm management can also be part of an overall pathogen-management strategy.

This becomes important when irrigation water is captured and reused. The *GrowerTalks* article states that recycled water has the potential to move pathogens between plants, but risk varies substantially depending on system design and management. Filtration, sanitation, irrigation practices and how the water moves through the production system all matter.

Nutrient-rich water provides food for microorganisms, and warm water (above 68F) favors biological activity while holding less dissolved oxygen. Dissolved organic carbon is another consideration because organic material provides a food source for microbial growth.

Oxidation reduction potential, or ORP, can be a useful measurement for understanding what's happening in the water. ORP provides an indication of the water's oxidizing or reducing environment and is measured in millivolts (mV). Justin illustrated that biofilm is much more comfortable around an ORP of 350 mV than under highly oxidizing conditions approaching 650 mV. You can measure this with a portable meter. Justin recommends using a Hanna Combo Meter.

The larger lesson is that we can't always manage water quality by looking at the water. Growers should consider establishing water-quality standards for their own farms and routinely monitoring measurements such as oxidizer residual, dissolved oxygen, ORP, pH, EC and water temperature. What is "normal" for your farm? Without establishing a baseline, it can be difficult to recognize when something begins to change. You can work with an extension specialist and a water testing lab to help you establish these baselines.

Justin encourages you to check alternative solutions before reaching for another chemical treatment. For instance, look at filtration. Removing suspended solids reduces the organic load entering an irrigation system and eliminates some of the surfaces that bacteria can attach. Organic carbon provides food for microorganisms, and suspended solids can shield microorganisms from certain treatments, contribute to clogged emitters and filters and reduce irrigation uniformity.

Filtration is emphasized as an important component of managing reused irrigation water. Removing debris and soil particles not only reduces material capable of carrying pathogens, but can also improve water quality by reducing the decomposition of organic matter.

Once biofilm becomes established, chemistry alone may not solve the problem. A "shock and flush" approach combines sanitation with physically removing material that lives in the irrigation system. Justin described using oxidative disinfection followed by sufficient contact time and a high-velocity line purge. The important concept is that killing or loosening biofilm is only part of the job. Detached organic material still needs to leave the system. Otherwise, you're just moving the problem farther down the irrigation line, where material can contribute to clogged valves and emitters.

After cleaning, the focus shifts to maintaining water quality. Depending on your irrigation system, you may consider oxidizers such as peracetic acid (PAA), chlorine, hydrogen peroxide products or ozone. *GrowerTalks* discusses several water-treatment technologies and points out an important distinction: Some treatments can be effective at reducing free-floating microorganisms in source water without necessarily solving an established biofilm problem inside irrigation infrastructure.

Testing is critical when using any sanitizer or oxidizer. More isn't necessarily better, so experiment with small batches first after rinsing out the system. Excessive oxidizer concentrations can damage roots and create plant stress. On the other hand, concentrations that are too low may not sanitize the system. It's a delicate balance. ORP or residual testing gives you a way to verify what is actually happening instead of assuming that injecting a treatment means the entire system is clean.

Biofilms: Where Do Nanobubbles Fit In?

Nanobubble technology is another tool you may encounter when researching irrigation water management. Nanobubbles are extremely small gas bubbles that can remain suspended in water. Nanobubbles can be used to increase dissolved oxygen. They can help loosen or suspend biofilm and other particles so they can be flushed from an irrigation system.

This makes nanobubbles an interesting biofilm management strategy. But they shouldn't automatically be viewed as the single solution for your farm. There are many factors that influence which treatment strategy makes sense.

For one farm, improved filtration and carefully monitoring sanitation program may be enough. Other farms may benefit from ozone, peroxide-based products or another oxidizer. For farms that are having

problems with dissolved oxygen or persistent biofilm, nanobubble technology may be worth investigating. That is why it is important to establish your baseline water quality standards to determine the best course of action for your farm.

Do your homework before investing in a water treatment system. Talk with water treatment professionals, ask other growers about their experiences, test your own water and understand exactly what problem you're trying to solve. A technology that works beautifully at one farm may not necessarily be the best or most cost-effective solution for another.

The biggest takeaway from Justin's presentation is that biofilm management shouldn't be approached as a single treatment. Start clean. Establish baseline water quality. Filter organic and suspended material. Monitor water routinely. Maintain appropriate sanitation. And when biofilm becomes established, don't just kill it. Make sure you're physically removing it from your irrigation system.

Water quality is more than just what comes out of the well, pond or rainwater tank. It's about everything that happens to that water between the source and the plant.

Seeing Our Flowers Through a New Lens



Our masterpiece from this weekend.

To round out this edition of *Bloom Beat*, Tater and I will sign off with something a little less technical than biofilm.

This past weekend, I had a one-on-one design lesson with a very close friend, Helen Miler AFID. Helen graciously attempted to teach this flower farmer a few things about actually arranging the flowers we grow. I always knew it was an art ... and it's a lot harder than it looks!

Most days, Tater and I are thinking in terms of market bouquets and grower's bunches—all flower heads in the same plane. It was fun to slow down and learn how a professional designer uses different heights, colors, textures and movement to create something dynamic that captures a snapshot of the season.

I also learned how to use Syndicate Sale's Pillow. It's a clever alternative to chicken wire. The pillow sits on top of the vase and gives you a structure to thread individual flower stems through. The openings help hold each stem securely where you want it, making it much easier to play with different heights and angles without everything immediately flopping back into the center of the vase. It gave this beginner a boost of confidence and a much better understanding of how designers can create airy, dynamic arrangements with flowers floating exactly where they're supposed to be.

It's incredible that florists can achieve this art without the pillow. But to be honest, I appreciated having this set of training wheels for this creative exercise. Tater and I "played" with everything, including lisianthus, cosmos and dahlias. While Tater and I have absolutely no intention of becoming professional floral designers, I don't think we did too badly for our first attempt.

More importantly, the experience reminded me how healthy it is to occasionally step into our customers' shoes to better understand what they're trying to accomplish with the products we grow. Even during the craziness of peak season, we're trying to make time to learn something new, push ourselves outside our normal routines to better understand how our flowers are ultimately used and enjoyed.

After all, becoming better growers sometimes means looking at what we grow from an entirely different perspective.

Until next time!

Lindsay 

Lindsay Daschner (and Tater)
Editor-at-Large—*Bloom Beat*
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