



Edible Flowers, Academic Advances and Objective Taste



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# inside GROWER

Controlled Environment Agriculture

## COMING UP THIS WEEK:

- Edible Flowers
- Sustainable(?) Substrate
- ASHS Research Update
- AeroFarms Continues Operation
- InsectSense
- Priva Connex 916

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## Butterfly Pea Flowers and Other Edible Flowers

On May 12th, Starbucks released a new drink, and the advertisements quickly flooded into my coffee-laden life. The color of the beverage, a deep indigo, instantly caught my attention. The unmistakable blue of butterfly pea flower.





Butterfly pea flower's distinctive color shows up in a growing number of beverages, from Empress Gin to Bigelow's Sapphire Bay tea. It's quite shocking in person, almost unreal, and I had the opportunity somewhat recently to grow a few plants and see it for myself. The extract color shifts from blue to purple with a dash of acid like lemon juice or vinegar, which makes them as much a novelty ingredient as a colorant. I first learned about the crop from a PhD student here at CSU, Makenzie Lee, who has been digging into the edible flower market for some time now.



A butterfly pea flower in the CSU Spur Greenhouse.

All of this comes together this month. A publication released on May 4th by Makenzie Lee and Dr. Chad Miller, titled "[The US Edible Flower Market through the Farmers' Market Lens](#)," provides a detailed background and a snapshot of current trends in edible flower sales at farmers markets across the country.

The paper concludes that—based on survey data—marketability and public knowledge are the largest perceived barriers to broader industry adoption. Growers are interested, but buyers often don't know what to do with the product once it leaves the stand. Maybe a new drink from a big company can help move the needle on new crops in CEA; exposure on a Starbucks menu reaches an enormous audience.



## How Sustainable is Sustainable Growing Media?

A soon-to-be-published article hopes to bring attention to an area without much standardization: sustainable growing media. A team of researchers from Norway and Belgium are publishing a perspective article in *Frontiers in Horticulture* titled "The challenge of defining 'sustainable growing media': Why the term is used incorrectly and what needs to be done about it."

Based on the abstract, the article points out misleading terminology and perspectives within the horticultural substrate industry. Much like food and beverage terms such as "natural," "eco-friendly" and "climate-smart," the term sustainable substrate doesn't carry the same level of standardization as something like OMRI or USDA Organic.

The paper dives into a wild and rarely appreciated world of nuance. The authors argue that basing sustainability on material alone, such as choosing coconut coir over peat, without including factors like economics, horticultural performance and social responsibility is inadequate for defining sustainability. In fact, many narrow assumptions are made about the overall impact of switching from a conventional to a "sustainable" growing media. For example, if the "sustainable" media performs worse and is more energy intensive to use, it may end up being more impactful on the environment, even if the material

itself exists in abundant and renewable quantities.

The paper discusses how the sustainability of materials is highly context dependent. The authors propose a minimum of eight conditions, with importance placed on measurable impacts, functional performance, economic feasibility and other trade-offs. Overall, a more holistic and circumstantial perspective on sustainable media will help guide growers toward making a real impact.

[Check out the abstract here.](#)



## ASHS Key Environmental Strategies to Improve Leafy Greens

The University of Georgia's horticultural research has been featured by CEA's main academic society, the American Society for Horticultural Science. Recent work out of UGA has focused on hydroponic leafy greens.

Three projects were featured in the article. The first demonstrates the importance of not just maintaining dissolved oxygen in hydroponic nutrient solution, but actively boosting it above typical levels. Using oxygen generators to roughly double the normal air-saturated dissolved oxygen concentration produced significant yield increases. The study also included an economic analysis of the specific oxygen generation system used in the trial and found that, in their setup, the operating cost outpaced the yield gains. That doesn't close the door on the strategy, though. The biological response is clearly there, and there are plenty of ways to get more oxygen into a system without leaning on the most expensive option.



Images of tipburn severity from one Dr. Ferrarezi's recent publications.

The two other featured pieces look at related corners of leafy green production: how light intensity and nutrient solution management can be optimized together, and strategies for preventing tipburn in lettuce. Tipburn in particular remains one of the most frustrating physiological disorders in indoor lettuce, so any progress on the management side is worth a look.

Taken together, the three papers represent a useful snapshot of where applied hydroponic research is heading and how it can be useful for growers.

[Read more here.](#)



## AeroFarms Update

In the latest round of updates, AeroFarms claims to have avoided a shutdown for the near future. Vice President of Human Resources Carlos Nunez announced that the company had rescinded its WARN notice, an official notice of imminent mass layoffs or plant closure. This marks a strong signal that AeroFarms will continue to grow and sell produce for the foreseeable future.

In March and April, AeroFarms had stated that the company would soon be sold or close permanently. Despite the withdrawal of the WARN notice, no announcements have been made about an acquisition or additional funding. The company stated it would share more at a later date.

While it's good news for the moment, much uncertainty remains around what AeroFarms will look like in a few months. The number of employees retained, the scale of operations going forward, and the availability of new job opportunities are not currently known. The mystery behind the immediate path forward, funding, buyer, or otherwise, leaves a lot of open questions for both the workforce and the wider industry watching from the sidelines. We'll be sure to check back in later in the year.

[Read more about the story by following the link.](#)



## InsectSense

In an interesting development out of the Netherlands, the Dutch company InsectSense has delivered and installed their first ReceptomiX system at Wageningen University. In a truly mind-boggling process, InsectSense has built an artificial olfactory system capable of producing objective sensory data. In other words, they've made a tongue for computers.

The revolutionary aspect of the device is that the chip itself uses actual insect and human-derived olfactory and taste receptors as the sensing elements. Rather than inferring how taste works from the presence or absence of certain chemicals (which has been the limited way we've approached this in the past) the system measures what actually activates the receptors, and to what extent. It's the difference between reading the ingredients list and watching the response in real time.

The takeaway for our industry, and why this lands at Wageningen, is that the same approach can be used to objectively measure how plants taste, alongside its use in screening other health-related compounds. Breeding and growing for flavor has become a much higher priority than it used to be, but progress has been slowed by how subjective and expensive human taste panels are. Technology like ReceptomiX could give breeders, growers and CEA operators a clear, repeatable and scalable way to put numbers on something that's historically been all gut feeling. That's a meaningful change for an industry that increasingly competes on quality, not just yield.



A look at how various receptors, arranged in a grid, respond to a given sample. Image from InsectSense.com

## Priva Connex 916

In a major upgrade, Priva announced the release of Connex 916. The update centers on getting more out of variable-intensity LEDs through a finer-tuned approach to lighting control.

The key advance over previous versions, like Connex 914, is the ability to set a consistent micromol target for your crop. The system now allows growers to target a specific light intensity and modulate LED brightness to hit it. The result is stable, predictable, precise lighting and more efficient use of the fixtures themselves, which translates to electricity and run cost savings.

Where this gets most interesting is in fluctuating light conditions. On partly cloudy days, supplemental light will now quickly ramp up and down constantly to keep the lighting target in micromols.

That said, light is only one piece of the picture. A point I've found in my own research, and one made in Growing with Plant Empowerment, is that sunlight and narrowband LED light aren't interchangeable, i.e. the same PAR value from different sources call for adjustments to other factors like temperature and humidity. Modulating light precisely is a real accomplishment, but the harder problem is what surrounds it. Climate, irrigation and lighting all influence each other, and the next frontier is control systems that can navigate those interactions together rather than variable by variable. Priva has done excellent work on the light side; I'm curious to see where they'll go next.

[Read more here.](#)



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