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You Can't Automate Vision

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Controlled environment agriculture (CEA) is often celebrated for its precision. We fine-tune nutrients, manipulate light and monitor every drop of water. But in a field driven by data and repeatability, it's easy to forget that many of our biggest breakthroughs started not with answers, but with curiosity.

Creativity isn't an accessory to good science or growing. It's at the core of it. It's what happens when we pause, wonder and rethink the question entirely. Often, that's where the real progress begins.

We write this article from different seasons in our careers: one at the beginning of the journey, the other reflecting on decades of discovery and mentorship. From both vantage points, we've seen how grounded, problem-solving creativity makes science and growing better. It

appears when you change an approach, question an assumption or follow a thread of curiosity others overlook. This is our shared reflection and a reminder to treat creativity not as extra, but as essential, to progress in horticulture and CEA.

Creativity as a way of thinking

Most people imagine science as a clean line: ask a question, run a test, get a result. In practice, the path bends. The results surprise you. Sometimes the most important step is pausing to ask a different question.

That's the essence of creativity in horticulture. Psychologists call it divergent thinking—looking at a problem from multiple angles and reshaping the question when needed. Many of us practiced this long before we knew the term. Some of our most interesting work came when the question itself changed.

The ability to stay open—not just to outcomes, but to reframing the challenge—separates the technician from the innovator. In research and production, there's pressure to deliver answers that fit expectations. We reward clarity and quietly punish ambiguity. Yet ambiguity is often where the story begins. It forces us to ask whether we're even pursuing the right question. The most creative minds thrive there: in the willingness to sit with uncertainty and look for signals others miss.

As Walt Whitman said, "Be curious, not judgmental." Curiosity lets us see possibility in uncertainty instead of rushing toward a single "right" answer.

Rethinking what progress looks like

In the early stages of research or product development, there's a temptation to prove something novel—to design a method or tool that leaves a mark. Over time, it becomes clear that creativity doesn't always mean building something new. Sometimes it's about asking the right question and changing it when the path turns.

That shift releases the pressure to constantly “solve” and lets us listen to the work. A failed experiment doesn't always mean something went wrong; some of the best insights come from unexpected results and patterns we didn't plan to find. An odd signal in the data isn't necessarily a mistake—it may be a real story worth pursuing. Thinking outside the box doesn't ignore science; it leans into it. Data isn't just numbers; it's behavior and context.

This is where creativity lives: between method and meaning, between control and curiosity. It also shows itself in the conversations we have. Sharing an idea before it's refined takes courage and many good ideas are lost because they don't feel polished. Progress rarely begins with a perfect pitch. It begins with the willingness to speak up, sketch an imperfect thought and explore it openly.

Creative habits that make us better growers

Creativity doesn't begin and end in the greenhouse or lab. Often, it's sparked in places that look nothing like science. Creative practices outside our work—whether playing music, woodworking, writing or sketching—reset the mind and unlock fresh insights. These habits engage both the analytical and imaginative sides of the brain, sharpen problem-solving, build patience and develop a sensitivity to detail that transfers directly back into growing.

But creativity is something we can lose if we don't practice it. In fields like CEA, where innovation matters, cultivating creative habits isn't optional—it's a way of keeping the mind open. A simple approach is to treat every workshop, meeting or conference as an opportunity to learn one new thing. It doesn't need to be groundbreaking—just a fresh idea or technique you hadn't considered before. That steady practice of curiosity keeps creativity alive.

The same is true outside the classroom or greenhouse. A grower who spends time building or fixing things gains a hands-on understanding of materials and structure. A researcher who draws or writes trains the eye to notice nuance. These skills matter in horticulture, where troubleshooting, design adjustments and subtle observations often make the difference between a system that works and one that struggles.

Tinkering is more than a pastime—it's a training ground. Hobbies that encourage trial and error and spatial awareness strengthen the same instincts we use when adjusting crop strategies, rethinking airflow or refining a system layout. Stepping away from the direct task of growing sometimes gives the mind the space it needs to solve the problem. That reset—whether found in a sketchbook, a messy workbench or a patch of soil—can send you back with clearer eyes and better ideas.

The mind behind the crop

Creativity isn't confined to academia; growers demonstrate it every day. It's in the person who reworks their gutter brackets to improve spacing, the one who changes transplant timing because something feels off or the team that rearranges their workflow after noticing inefficiencies.

These aren't always headline innovations, but they're acts of design, iteration and responsiveness. Creativity starts with observation. It's in the small changes and micro-decisions that shape an operation over time.

As systems scale up and become more automated, some of that space to explore can get lost. Yet growers

still carry a map in their heads—a sense of what's normal, what's working and when something needs adjusting. Trusting that internal feedback loop is part of staying creative, even in structured systems.

This is also why an overemphasis on optimization can backfire. We've seen many young scientists and growers trained to maximize efficiency at every step. If there's no room to wander or to fail, creativity dries up. Preserving space for exploration, both in research and in production, is what keeps innovation alive.

What often separates excellent growers from good ones isn't just how well they follow protocol—it's how well they observe, adapt and create. Those moments of tweaking a fertigation schedule, adjusting airflow strategies or rigging a new trellising system are quiet acts of creativity. They deserve more recognition than they often get.

Learning through failure

One of the hardest things to accept is that failure isn't a sign you've gone off course. In fact, it is the course.

We're taught to minimize errors and aim for predictable outcomes. Yet the most interesting lessons often emerge when something doesn't go as planned—when a drain EC spike isn't just noise or when a set of outlier data reshapes the whole understanding of a trial.

Creative thinking gives failure purpose. It helps us see mistakes not as flaws, but as leads. It encourages us to keep asking: Is there something here we didn't see?

Some of the most valuable discoveries in horticulture have come from in-field observations, improvised workarounds or off-hand remarks. They weren't always part of the original plan, but they were noticed—and that made all the difference.

The only reason they were noticed was because someone chose not to ignore them. Chose to lean in. That mindset isn't always taught. It can be learned and modeled. And once learned, it can be passed on.

Mentorship plays a powerful role here. Encouraging young professionals to question, explore and even disagree can plant the seeds of future breakthroughs. We don't just pass on knowledge; we pass on the confidence to be curious.

The root of all discovery

This isn't a call to abandon structure; it's a reminder to leave space for wonder.

If you're in the field, in the greenhouse or in the lab, pause and ask: Are you still chasing the right question? Has it evolved with what you've learned? Or is it time to reshape it?

We need room to think, to test, to fail. To tinker. To get it wrong before we get it right. Because that's where the learning is. That's where the next idea lives. As Albert Einstein reminded us: "Imagination is more important than knowledge."

Draw that sketch. Rewire that part. Revisit the note you almost dismissed. Sometimes the most important thing we grow in a greenhouse isn't just a crop. It's a better question. **IG**

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