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It’s Not Rocket Science … It’s Agriculture Science

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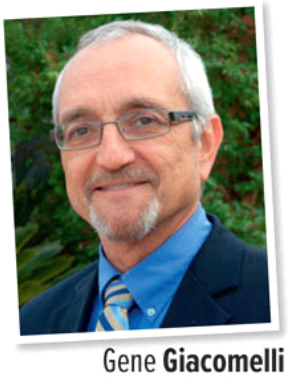

Unlike spaceflight failures (and successes), as spectacular as they are, agricultural failures are more subtle, but can be just as catastrophic, causing hunger and hardship that may immediately affect many more people. Leon Panetta believes it’s a security issue. Yes, the former U.S. Defense Secretary at the 2023 Salinas Biological Summit said, “Americans take ag for granted,” and that perception needs to change to focus on the health of our society.

He emphasized the importance of public funding for research and education within the Land-Grant Universities. I agree, of course. We’ve come so far in 138 years with abundant, affordable foods of plant and animal products. Thank you, President Lincoln, for the Hatch Act of 1887 that established the agricultural experiments stations within each state!

When I hear someone say, “agriculture is broken” and it requires disruptive forces for its repair, I cringe and hope that the person is just uninformed and will have the opportunity to become aware and educated about agricultural production. CEA isn’t to replace field agriculture, but to complement it. CEA is an adaptable production procedure overflowing with technology, able to fit into limited spaces on poor lands within unique applications. And that is how it should be utilized—when there’s an appropriate need, not as a generic solution.

Let’s take the computer chip—the science of physics created the chip. It’s fully understood, therefore it can be regularly improved to be more efficient, and it has known theoretical possibilities and limitations. Unlike with silicon chips, one cannot force biological response change. Plant and biological sciences are attempting to understand the biological mechanisms of the plant. The plant responds within its environment to growth promoting, as well as growth limiting, factors for steering toward its outcome. Using the chip analogy for plant growth is wrong, as attempting to grow too quickly may cause reduced output and potentially loss of the plant.

However, the chip’s capabilities have been employed within climate control systems through plant monitoring to enhance plant productivity, improve taste and nutritional quality, provide predictable yields, reduce need for pesticides, and more. Growers are provided with real-time informative data (ex. temperature, humidity) that’s processed into usable information (ex. VPD), which then supports their decision-making for the subsequent environment of the plant. The current challenge is to allow intelligent software control programs to analyze

many factors and provide the control decision.

The fully automated control of plant production without the need for the grower is in the future and well beyond the driverless vehicle. The demand for competent growers continues to increase as CEA facilities continue to develop. This has spawned new educational opportunities today that are far beyond the limited opportunities of the past. Forty years ago, there were a few universities in the U.S. with CEA research studies and none with CEA study programs. There was only one annual grower-oriented greenhouse engineering and crop production short course (at Rutgers University). There were regional gatherings of growers, mostly focused on the biological challenges of bedding plant and nursery crops production.

In 2025, many agriculture schools offer annual grower meetings, and several offer regular non-degree or certificate courses (Ohio State, Cornell, Michigan State), while organizations that combine academic and industry, such as GLASE (Greenhouse Lighting and Systems Engineering), provide online self-paced courses or in-person classes. Courses cover common topics like irrigation, nutrient management, greenhouse crop production and emerging technologies. ADVANCEA is organized by several U.S. universities and industry collaborators and provides online educational programs for advanced CEA producers.

Companies that provide equipment and supplies that are critical to CEA operations have contributed their expertise toward educating the public, either as individuals (Hort Americas, CropKing) or as a team (ACT, Advanced Cultivation Technology, a collaboration of four mainstays of CEA: Grodan, Philips, Priva and Svensson). Trade-based organizations (Indoor Ag-Con, Cultivate) also offer educational opportunities in the form of annual meetings, attracting many growers and an expanded trade show. Plant Empowerment, a plant-based approach to environmental control using fundamental laws of physics and plant physiological relationships, provides a teaching Academy to complement its manual describing “digital growing.”

Education in whatever form should be appreciated as everyone—including growers, industry, investors and researchers—benefit by the collective expertise that it helps to develop.

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