

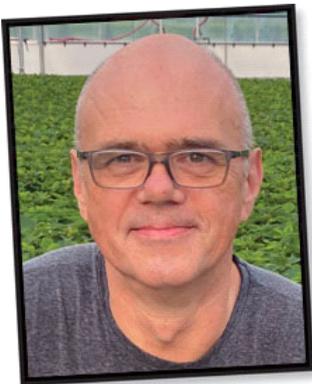
GROWERTALKS

Growers Talk Production

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There Are No Shortcuts to Plant Wellness

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We do the damage to ourselves. All of us would like to stay fit, feel good and remain healthy, but the concept of balance keeps us struggling. We know that we need a balanced diet, a balance of exercise and rest, and a balance of work and life. A balanced lifestyle, however, requires discipline and effort. So we take shortcuts, not the least because modern medicine offers seemingly attractive and convenient alternatives to the strenuous daily implementation of healthy choices. Our health care providers are all too happy to sort our age-related ailments into a handful of simple categories for which they can prescribe readily available and highly profitable medications. Such pills won't cure our self-inflicted ills, but they successfully—albeit temporarily—mask the unpleasant side effects that result from years of indulging in bad habits.

For greenhouse growers, this pattern of convenient shortcuts should be all too familiar. We tend to practice the same type of medicine for the plants in our farms. Shortcuts appear to save money while they wreck the balance in crops. There's no shortage of remedies being peddled for the resulting production problems, and we tend to ignore any nagging questions about efficacy or side effects.

Farmers are just as happy as doctors to distill plant health into simple charts that match common ailments to popular treatments: Is the crop too pale or not green enough? Well, drench with some iron to green up the plant. Do the roots look unhealthy to you? Drench with a sequence of fungicides—the more chemical, the better the effect. Are your crops growing too slowly? Just turn up the heat and give them lots of Nitrogen. Is Oedema damaging your crop when growth is too soft? Have a stern talk with your grower because the culprit must be either too much water or too little.

Shortcuts in growing may be convenient, but they don't serve the wellness of our plants any more than our cholesterol pills and blood pressure medications fix the damage created by our unbalanced lifestyles. Fertilizer and pesticides cannot fix problems that weren't created by plant pests or lack of nutrients. Such "medications" simply cannot correct growth factors that are grossly out of balance; they merely gloss over secondary problems created by these imbalances. Our predicament is that the analogy ends here because growers only get paid when our patients are alive and in good health when they leave the greenhouse.

The principles behind plant wellness aren't new. The significance of growth factors, the consequences of their

limitation and excess, and the fundamental tools used to manage them have been known since the time when Liebig figured out what mineral nutrients are all about. Good growers intuitively understand how plants react to changes in environment and nutrition. Intuition, however, isn't reliable and often falls prey to daily pressures. Preventative plant medicine is complex and knowledge-intensive. It requires a perspective that falls outside of the comfort zone of most growers and there it must compete with the simplicity of popular shortcuts like "spray-and-pray."

A group of plant scientists, supply companies and innovative growers are trying to change this. Their buzzword is "Plant Empowerment," which aims to "optimize growth climate by steering the plant's balances." In my own work, I like to refer to this concept as "Plant-Centered Growing." Traditional crop control uses a limited set of tools based on few measurements and plenty of intuition. These tools are mostly used reactively. Plant-Centered Growing, on the other hand, attempts to predictively optimize crops by understanding growth factors as they're experienced by each plant and by managing their balance to achieve desired outcomes.

For example: instead of compromising with fixed temperature targets (setpoints) for heating the greenhouse, Plant-Centered Growing dynamically changes the heat-energy inputs, temperature targets and day/night temperature gradients in real time based on currently available light, available carbohydrates from light accumulated over time and transpiration potential (VPD) experienced by the crop. The grower can "steer" the development of the crop by managing the balance of these factors.

Prerequisites for such methods include a clear idea of the objectives that we're trying to accomplish in the crop and a deep understanding of how growth factors "make a crop tick." Grower intuition is valuable, but it must be coupled with the ability to extrapolate plant experiences from ambient measurements or with the capacity to directly measure the necessary parameters with a new generation of sensor technology. We need to move outside of our little boxes and we may as well start while it's not too crowded out there yet. **GT**

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