GROWERTALKS

Features

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Faster, Better, Smarter

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In this day and age of modern streamlined production systems, two objectives stand out in the discourse of improvement: production efficiency and prevention of adverse environmental impact.

Sometimes they're described as opposites, in which case, production efficiency can be conflated with concern only for profit and environmental awareness only with regulations. Even though regulations can stand in the way of increased profit in some cases, and vice versa, there's no inherent conflict between the two.

Actually, it's quite the opposite—production efficiency and environmental concern are fundamentally two sides of the same coin.

In the pictures, you see two different production systems for growing strawberries (via drip irrigation and hydroponic). Still, the principles for optimized production efficiency and lowered adverse environmental impact are the same for both.

Production efficiency is very much about maximizing input-use efficiency, thus making sure that nothing is unnecessary or wasteful. Concern for environmental impact, on the other hand, is about making sure that no input is ending up where it shouldn't, i.e., in the ecosystem instead of the plant production system.

In other words, both can be optimized by good resource management. This is also beneficial for the wallet, as a key target will be to minimize waste, both in the sense of toxic and in the sense of wasteful.

Water efficiency

A really good example of this would be the resource use efficiency of water in irrigation. By using high-tech solutions to optimize the water supply, the system can be managed to have very small losses.

Now, water isn't a pollutant, but with fertigation involved, it can be. And this goes for all systems. The fertilizer management in the fertigation programs is very important. Regardless if the system is an open one or a closed circulation system (such as hydroponics), the fertilizer supply in the irrigation will be crucial.

For an open system, it's more obvious that an excessive or imbalanced fertilizer supply will lead to more losses, and in the long run, leaching problems that can pollute the groundwater.

But we have a similar problem with closed circulating systems, even though it doesn't entail leaching, per se. Every so often, depending on the fertilizer management, unwanted levels of certain nutrients/salts will accumulate. This means that the circulation water sooner or later will be rendered unfit for the production system and therefore disposed of.

To avoid this, two things need to be managed: First, it's very important to balance the nutrients, and hence the fertilizers, in such a way that a balanced uptake is enabled. This, in turn, leads to a lowered accumulation of unwanted compounds in the circulating solution.

However, there's a second area that's very important to manage in order to keep this problem at a minimum: that's the level of the concentration of nutrients as a whole in the solution. This is the actual parameter that's investigated when measuring EC levels. EC is just the proxy.

Water & fertilizer working together

There are different contending ideas on how to best manage this. It's common to keep this concentration quite high, as nutrient uptake is related to the "sum-total" concentration in the system.

I know that many growers, as well as experts, believe this to be optimal for systems, including hydroponics. However, I do not. I contend that the best way still is the simplest and most straight-forward approach—to supply nutrients on demand. Contrary to common belief, this is very suitable for circulating systems.

Let me explain why … to supply on-demand is to add doses of fertilizers to the circulating system in accordance with the growth rate of the plant. Or, more specifically, according to the relative growth rate of the plant. The relative growth rate is the percentage daily increase in weight. The concept therefore means that the doses of nutrients should increase with the same percentage as the daily weight increase of the crop. If you do this, you really give the crop what it needs when it needs it and all of the added nutrients can be taken up. It's been shown that this is the exact case in circulating systems, in which the concentration has been kept very low, but perpetually replenished, as the crop assimilated virtually all nutrients immediately.

The very point of adding small doses very frequently is to keep concentrations low and to use the recirculating system as a means to enable immediate and absolute nutrient uptake, instead of an elaborate attempt to reuse the excess nutrients not utilized in the first loop.

Not only does it enable optimized fertilizer use efficiently, it's the most environmentally friendly way to do it, and it's the least expensive way as well. It also takes less labor and supervision, as it's the simplest way.

This is just one clear example of production efficiency and environmental care going hand in hand. The main principle is to accommodate the crop to reach its highest potential with as little input and small losses as possible. From that principle, production efficiency, minimized environmental impact and profitability flows by necessity. The same goes for virtually all inputs, like pest management agents, soil, biostimulators, artificial light … and the list goes on.

Of course, this isn't to say that all aspects of production efficiency are always directly related to this principle. In some cases, the necessary ways to manage aspects of the production that can be a "threat" to the environment will be costlier and demand more time. An example of that could be regulations on how to use certain chemicals. However, even in these cases, the chemical adds more value to the production than it consumes. Otherwise, it simply wouldn't be meaningful to use it; if the regulations are too heavy, it will simply mean that the product won't be in use.

So, in the final analysis, the most elementary approach and the most fundamental aim, should be to grow more with less. Sometimes it takes an investment, but it's profitable in the long run. Even though this approach is not a

universal bulletproof recipe for success in every imaginable situation, and it might need adjustments, it's the straight-forward rationale that must serve as the foundation behind every attempt to improve production efficiency and minimizing adverse environmental impact. **GT**

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