GROWERTALKS

Features

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Preventing the Great Escape

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Greenhouse growers have the opportunity to own the winter market. While their competitors close up shop for the winter, their production schedule can stay pretty consistent during the winter months. Of course, that depends on one invaluable resource: heat.

Every year as winter descends, growers spend time focusing on and fine-tuning their greenhouse's heating system. Heating is no doubt one of the largest financial burdens for operations in colder climates, so even the smallest upgrade can make a huge difference. Because of this, discussions on heating solutions can border on obsessive. What's so interesting about improving a heating system is that often times an operation's heat inefficiencies come down to some very basic, but often overlooked, greenhouse techniques and principles. Above all else, growers tend to overlook the materials they've used to construct theirgreenhouse.

What's your R-value?

"In the long run, growers are going to want to take a look at what their growing structure is built out of," said Will Kacheris, who designs commercial greenhouse systems for GrowSpan Greenhouse Structures. "There is a lot of potential to increase heating efficiency by building with materials that have a higher R-value."

Pictured: Crops can easily thrive on a year-round basis in a polycarbonate greenhouse.

R-value is the measurement of thermal resistance provided by a given material, so growing in a structure that has a higher R-value as a whole can make a big difference in heating costs come wintertime. Growers that carefully calculate their heating requirements or potential heat loss know the benefits of a high R-value in both a practical and numerical sense.

When calculating heat loss, the University of Georgia Extension has recommended using the following equation: Q=A(Ti-To)/R.

In this equation, Q equates to heat loss by the hour in BTUs. The A is for the area of a greenhouse's surface in square feet, while the (Ti-To) is the difference between indoor and outdoor temperature. The R then stands for R-value. This equation is the perfect example of how growing in a structure with a higher R-value can significantly improve the efficiency of an operation's heating system by reducing heat loss.

Avoiding heat loss

A great building material for greenhouses in colder regions is twin-wall polycarbonate. A number of growers opt for glass cladding over polycarbonate, which is puzzling. While a glass greenhouse can provide a year-round growing environment and is superior to other options, once the winter months come, managers of glass greenhouses will have to spend much more to heat the structure. The R-value of 3 mm glass is 0.95, while twin-wall polycarbonate can provide an R-value of 1.72. This means that the heat loss in a glass greenhouse is nearly double and leads to a drastically higher cost to heat the structure.

Besides the value provided via heating efficiency, cladding a greenhouse in polycarbonate has a number of other benefits. Polycarbonate is more durable and often times it comes with a 10-year warranty, ensuring a long and dependable life. It also provides better light diffusion and UV protection, but what really separates it from glass is the cost and ease of installation.

In addition to being cheaper, polycarbonate is ultra-light and it generally only weighs about one-twelfth of glass. This, combined with the fact that polycarbonate is available in more shapes and sizes, allows growers to quickly install their cladding and many times growers are able to install the polycarbonate without the help of professional installation.

There's no doubt that for many growers, retro-fitting their structure with polycarbonate won't be in the budget any time soon. If this is the case, Will recommended growers look into air-inflated double poly.

Air is an excellent insulator. Double poly film captures a small amount of air between the two layers, creating a well-insulated structure for a fraction of the cost. A small compressor is required to inflate the space between the film, but the cost here is negligible. One extension professor at the University of Connecticut stated that the R-value of air inflated poly can be as much as 1.5, so even as a cost-effective option, air-inflated poly is far superior to other materials.

Regardless of whether a grower has the plans to alter their structure's walls, every grower can start with the basics leading up to the winter months. This means sealing up any cracks or avenues that heat can easily escape from and this can simply be done with a can of expanding foam. After this is done, growers can improve the insulation of their structure by installing double-bubble insulation. Adding a foil face to this insulation can also be helpful, since aluminum is highly reflective, and therefore, reflects heat. This is an easy way to boost the R-value of any insulation, but since it doesn't allow light to filter through, it obviously can't be used throughout the entire structure.

Will also stressed the importance of growers running a full check on their heating system before the cold sets in by making sure tanks are filled and generators have been tested.

"An instant and easy upgrade for winter heating is the addition of an alarm system. Something like the Sensaphone alarm links to your phone and can send alerts to any significant temperature changes," he said.

It's shocking how many times an unknowing grower arrives at their facility to find out that a depleted propane tank has led to their crops spending the night in dangerously low temperatures. Adding an alarm system will allow growers to know if their system breaks down during off hours and can provide growers with some peace of mind when they aren't at their operation. Integrating an alarm system can send notifications for a power failure, extreme changes in temperature, dangerous humidity levels and much more.

While sealing cracks and adding an alarm system can seem basic, improving a greenhouse's wall materials is actually even more basic, but incredibly effective nonetheless. While growers are thinking about how to improve the functionality of their heating systems, they're often ignoring the R-value of their structure. Increasing this one number can increase a structure's ability to retain heat, and in turn, provide operations with significant savings on their

heating costs. **GT**

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