Now that the heating season is in full swing, the roar of money burning through your boiler may remind you of the sound of a dentist’s drill. For me to suggest that you may want to heat more, not less, may be akin to an advertisement for a recreational root canal. Still, I believe that there is some sense to my madness, and I’ll go as far to suggest that you may be able to save some money, even if you have to pay a little more for fuel. So please do read on.

Why do we heat our greenhouses?
Temperature is only one part of the heating equation; crops also need a source of energy. This energy is necessary to keep vital juices flowing through the entire plant. The need for “flowing juices” is not unlike humans and animals, with the exception that we have actively pumping hearts to keep our blood in circulation. Plants don’t have any such active pump system. Instead, they rely on a source of energy for “juice circulation,” which is drawn (literally) from thin air. Plants are in trouble whenever this energy is not available and the potential problems can show up as a variety of physiological damage symptoms.

So where does this energy come from?
If you remember the dreaded subject of high school physics, you may recall that temperature is a state of matter and not a form of energy. This is true, even if your fuel supplier is unlikely to agree. Energy is used to increase temperatures, and energy is released when temperature decreases. But simply maintaining a warm and cozy greenhouse doesn’t mean that our plants have a source of energy available to them.

Plants make use of the Vapor Pressure Deficit (VPD). The concept of VPD expresses the difference between the pressure of water vapor just inside the leaf’s stomates, where a small amount of air is practically saturated with water, and the same water vapor pressure in the ambient greenhouse air, which is usually not saturated.

Water vapor, just like any other gas, will always move from areas of higher pressure towards areas of lower pressure, which causes some of the water vapor inside the leaf to “leak out” continuously, and disperse in the ambient greenhouse air. As the vapor moves out, more water evaporates inside the leaf, and this creates a
constant stream of water that moves from the roots to the leaves.

This VPD pump works well, as long as the foliage receives energy to compensate for the heat loss when water evaporates inside the leaves. And as long as the vapor pressure deficit in the greenhouse air is large enough to keep “pulling” water from the leaves.

We don’t have to worry much about VPD in the greenhouse during summer or when it’s very cold. It’s not as simple, however, when it’s just modestly cool outside, and when we only need to apply very small amounts of heat to maintain target temperatures. During those times, it becomes very tempting for a greenhouse grower to close the ventilation tightly and to use energy curtains to lock as much “heat” (i.e. temperature) into the greenhouse as possible. Our plants, however, might starve for energy, regardless of the greenhouse temperature because, along with the warm air, we lock water vapor inside these closed greenhouses, and within a short time the air can be so moist that the juice flow in the plants stalls entirely.

These are the times when I would encourage you to make an effort to heat just a little more; just enough to avoid any of the funky physiological problems, which can be caused by this “angina herbae.” I usually do this by tuning the energy curtains to stay open until it’s cold enough outside so that the pipes turn on just a little under the closed screens. It’s even simpler to use the humidity control functions of the climate computer to remove some of the warm, moist air whenever the VPD is critically low.

The small amount of energy delivered from the heating systems can be vital to the crops. There are times when even a dentist’s drill is a welcome tool. GT

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