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10 ways to lower your spring heating bill and save money

Energy costs have been the most talked-about subject in Michigan this year, and they are causing a lot of stress for greenhouse growers in colder climates, especially in the Midwest and Northeast.

The most recent surge in fuel costs is occurring as profit margins for many growers are decreasing. Now more than ever, growers need to produce their crops efficiently yet also keep the quality of their products high.

Labor is typically the highest production cost for U.S. greenhouse operators. Certainly, efficiencies in labor should be a high priority. Labor efficiency can be improved by increasing automation for transport systems, transplanting and watering, although significant investments are often needed to purchase, install and implement newer technologies.

Energy is usually the second highest production cost for greenhouse operations in temperate climates. As we head into 2006, fuel costs for many greenhouses will be substantially higher then they've been in recent history, and perhaps ever.

How to reduce your energy consumption

Here is a list of ways greenhouses can reduce energy consumption per crop grown. Some suggestions require capital investment, but in most situations, the return on investment will be significant, especially if fuel costs remain high.

1. Don't cheat on heat. Many growers are tempted to lower their heating set-point to reduce energy consumption. In many instances, the energy input per crop grown during the spring increases as the average daily temperature decreases. This might initially seem counter-intuitive, but think about it more carefully.

What is the consequence of lowering the greenhouse temperature? Crop timing increases as temperature decreases. If you plan to market your plants on the same date as in the past, then you need to begin growing the crop earlier, meaning you will have to start heating your greenhouse earlier.

In simulations performed at Michigan State University, researchers found that energy consumption in spring is actually higher when crops are grown cool, especially with warm-season crops like celosia, New Guinea impatiens and vinca, because the greenhouse has to be heated longer.

2. Use a retractable energy/shade curtain. Most of the energy consumed in a greenhouse is used for heating, and most heating (around 80 percent) occurs at night. Deploying a retractable shade/energy curtain at night can significantly reduce heat loss by providing another insulating layer. When deployed, an energy-saving curtain (closed weave construction) appropriate for light conditions in the Midwest can reduce light transmission by 35 percent during the day and reduce heat loss by up to 60 percent at night. An open-weave shade curtain that reduces light transmission by 38 percent can also elicit a 25-percent energy savings at night.

3. Provide supplemental light to plugs. Most seedlings and cuttings are produced in late winter and early spring when natural light levels in the northern half of the United States are low. Increasing the light level can accelerate crop development by increasing plant temperature and by reducing the number

of leaves formed before the first flower develops.

Research at Michigan State has shown that a celosia plug grown under an average daily light integral (DLI) of 14 moles per square meter per day flowered 10 days earlier after transplant compared to a plug grown at the same temperature but under an average daily light integral of 5 moles per square meter per day.

The installation and use of supplemental lighting, usually from high-pressure sodium lamps, can be a cost-effective strategy to shorten crop timing. The cost of lighting one 288-cell plug for three weeks is about one-third of a penny — an investment that can reduce finish crop timing by five to seven days for many bedding plants.

4. Provide long days to long-day plants. Many bedding plants and perennials are long-day plants, meaning that they flower earlier when grown under a long photoperiod. Long-day plants include ageratum, blue salvia, dianthus, pansy, petunia, rudbeckia, snapdragon and tuberous begonia.

During spring, the photoperiod is naturally short until April, so flowering of early crops of long-day plants is delayed. To accelerate flowering and reduce crop timing, provide photoperiodic lighting using incandescent or high-pressure sodium lamps delivering at least 10 footcandles (2 micromoles per square meter per day). Lamps can be turned on at the end of the day until 10 p.m., or they can be used from 10 p.m. to 2 a.m. for night interruption lighting. As a rule of thumb, use long-day lighting during the last two weeks of the plug production stage and during the finishing stage until the first flower buds are visible.

5. Improve insulation. Look for gaps near fans, pads and doors. Make sure there are no holes or gaps in the greenhouse roof. Consider adding an extra layer of insulation to the north wall. Be mindful to not reduce the incoming light too much. Installation of a third layer of polyethylene film may be wise if you are producing low-light crops. However, this extra layer of poly could produce a lower quality crop and slightly delay crop timing because of less transmitted light.

6. Grow cold-tolerant and cold-sensitive crops separately. Not all plants respond to temperature the same way. Plants like vinca and celosia grow very slowly at 60°F while other plants such as ageratum, pansy and ivy geranium continue to grow moderately well at this low temperature.

Whenever possible, grow cold-tolerant crops in one greenhouse at 61°F-64°F and cold-sensitive crops in a separate greenhouse at 72°F-75°F. A greenhouse with a third temperature (66°F-70°F) could be used for crops that aren't one of these two extremes.

7. Only open up a greenhouse when it can be filled. This is an obvious heat-saving strategy that shouldn't be ignored. Once a greenhouse is opened for use in the early spring, heat needs to be used whether it is full or not. If you have multiple ranges, try to schedule spring crops so that you fill each greenhouse when first opened.

8. Start with a larger plug size to reduce final crop timing. During the finishing stage, there are fewer plants per square foot of greenhouse space compared to the plug stage. Therefore, heat and lighting costs per plant are lower when plants are grown at the higher plant density during the plug stage.

Starting with a larger plug (e.g., switching from a 288-cell to a 128-cell plug tray), the plug stage production time increases by about two weeks, but the finish stage can decrease by a similar duration. If you start with a larger plug, the overhead cost per plant is decreased because the finish crop stage, when plants are widely spaced, is reduced. Although this strategy requires more space early, in the long run it can decrease the total production cost.

9. Install horizontal-airflow fans. Horizontal-airflow fans not only mix warm air with cool air, but also improve the uniformity of temperature within the greenhouse. If HAF fans are already installed, make sure they are operating properly and are well-positioned (not angled down toward crops or upward toward the roof).

10. Increase the heat/vent deadband. Avoid frequent cooling/heating cycles. The best way to do this is to increase the temperature deadband (the band of temperatures where no venting or heating occurs) during winter and spring. If the desired average daily temperature is 65°F, then a heating/venting set-point might normally be 63°F/67°F. Consider slightly increasing the deadband to 62°F/69°F. A slightly larger increase in the venting set-point will allow you to take advantage of heat from the sun. GMPRO