By Erik Runkle

Grow Warm or Grow Cool?

Using the Virtual Grower computer software is one way to determine how to get the best results at certain growing temperatures.

The development of Virtual Grower computer software, available free at www.virtualgrower.net, has enabled growers in the United States to predict heating costs for their greenhouses. Growers can use the program to help make decisions on growing temperature setpoints, use of alternative fuels and energy-saving investments. However, in my experience, the program is still vastly underutilized.

One of the significant uses of the program is the ability to predict the amount of energy needed to maintain a desired temperature at different times of the year. When combined with information on temperature's effects on crop timing, we can identify the most energy-efficient growing temperatures. In the past few years, researchers at Michigan State University and the University of Minnesota have been quantifying how temperature controls crop timing. For example, ageratum grown in 288-cell plug trays under a 16-hour long day and then transplanted and grown under long days take approximately 61 days to flower at 58° F, 43 days at 63° F, 33 days at 68° F, and 27 days at 73° F.

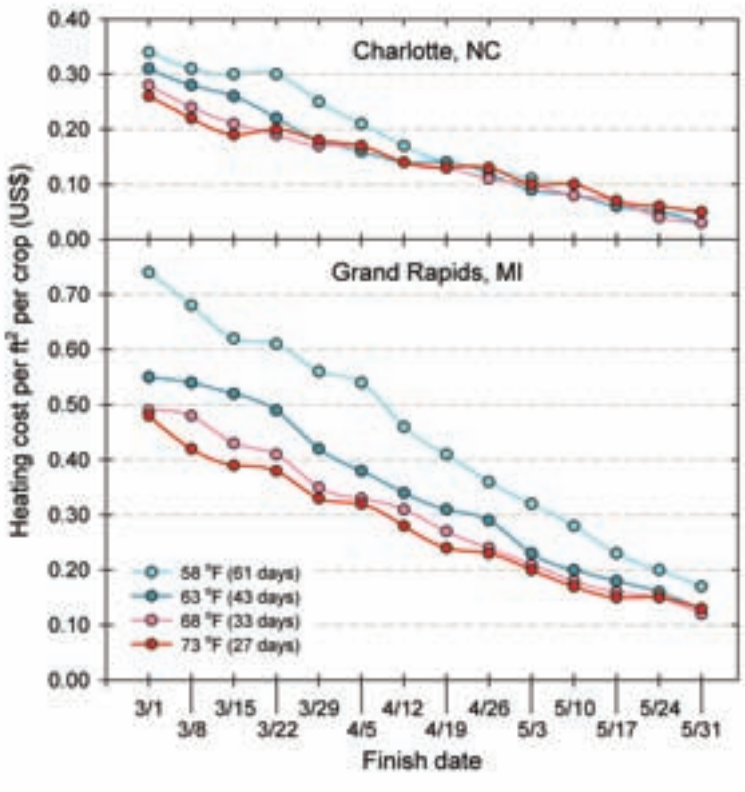

Figure 1. *Estimated greenhouse heating costs for growing ageratum using Virtual Grower, available at www.virtualgrower.net.*

With this information, growers can determine transplant dates so plants are in flower for predetermined market dates when grown at different temperatures. For example, for flowering of ageratum on April 5, plugs need to be transplanted on Feb. 3 if grown at an average daily temperature of 58° F or on March 3 if grown at an average of 68° F. Because of the substantial delay in flowering when grown cool, more energy may be consumed when growing at cooler temperatures than if grown warmer with a shorter finish time.

Figure 1 presents estimated greenhouse heating costs for growing ageratum using Virtual Grower. The costs are based on a per-square-foot, per-crop basis in two locations for finish dates in March, April and May. In Grand Rapids, Mich., it was always more expensive to grow ageratum cool throughout the spring season. In the winter, when daily heating costs are highest, it was cheaper to produce the crop warm to finish it in a shorter period of time. As the finish date ran into May, there were fewer differences in heating costs at different finish temperatures, but it was always more expensive growing ageratum at 58° F. Lower temperatures increasingly delayed crop development and increased total crop-heating costs.

Using the same approach — but for a greenhouse in Charlotte, N.C. — growing ageratum at 58° F was more expensive, on a per-crop basis, until mid-April. For most dates, the total energy consumed to grow the crop at 63-73° F was similar. However, growing warmer allows growers to turn crops more quickly, which opens space for another crop when space is a constraint for many operations.

So why doesn't *every* grower turn up the heat and produce crops more quickly? First, the information generated from Virtual Grower depends on the location, greenhouse characteristics and crop. That's why using Virtual Grower for your own greenhouse is so important: Results vary from one greenhouse to the next, so the program's utility hinges on spending a little more time to generate the most meaningful results. Second, under light-limiting conditions in the early spring, growing some species warm can produce low-quality plants. Therefore, plants that are typically grown cool, such as petunia, ageratum and snapdragon, should generally not be grown warmer than the low 70s until light conditions are higher (beginning in March in the North). GPN

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