By Erik Runkle

Dealing with the Cold

Heating a greenhouse in a cold climate is always expensive, but that's especially true for some growers this year. Although natural gas remains relatively inexpensive, distribution costs have skyrocketed in some cases due to greater supply constraints, especially in New England. It's naturally tempting to reduce the greenhouse temperature so that less energy is consumed per day, but there are consequences to such actions that growers should understand.

As most readers know by now, air temperature has the largest effect on cropping time. Time to flower increases as average daily temperature decreases, assuming no high temperature extremes. Therefore, to have plants in flower on a target shipping date, plants grown cooler need to be transplanted earlier. The magnitude of flowering delay depends on the temperature change and crop, and detailed information can be found in articles online at www.flor.hrt.msu.edu/annuals. Grower software tools, such as Wave Smart Scheduling for petunia and FlowersOnTime for over 50 additional crops can also provide guidance — both are available through www.flor.hrt.msu.edu/production-info.

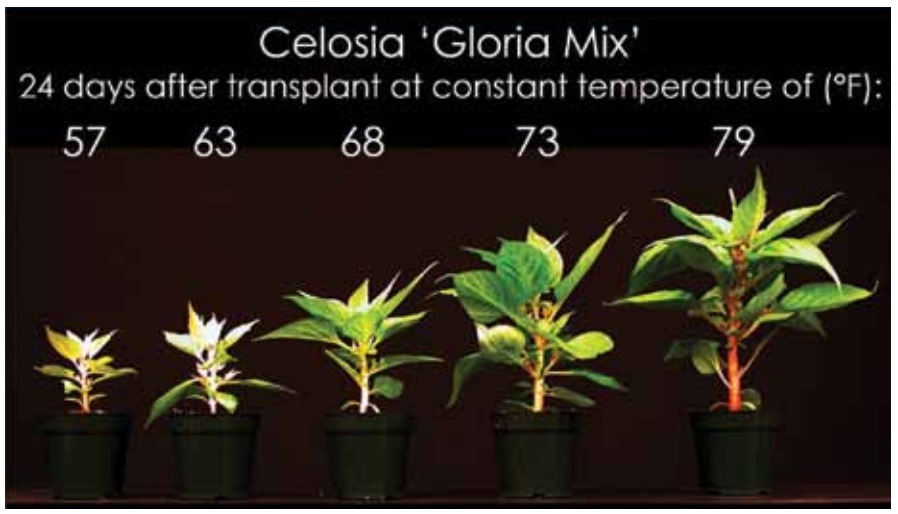

Figure 1. *Celosia develops slowly and yellow, chlorotic leaves when grown at low temperatures (top; photo by Lee Ann Moccaldi). Red- and purple-flowered celosia can also develop purplish leaves at such cool temperatures, as seen here with celosia plugs (bottom).*

Cold-sensitive crops are those in which flowering is especially delayed by cold temperatures. Examples include angelonia, blue salvia, celosia, gerbera, globe amaranth, hibiscus, pentas, portulaca, torenia and vinca. These plants stop developing at temperatures around 50° F, so even at 55 or 60° F, they grow very slowly (Figure 1). Some plants, such as celosia and hibiscus, develop yellow and chlorotic leaves at cool temperatures – so not only do they grow slowly, their quality is poor. Plants may also develop purplish leaves, which can be caused from excessively low temperatures or from a phosphorus deficiency.

Therefore, when possible, cold-sensitive crops should be grown at warm temperatures (greater than 65° F). If you want to grow some crops cool, do that for cold-tolerant crops such as diascia, marigold, nemesia, osteospermum, petunia and snapdragon. Although a lower temperature will also increase finish time of these crops, the extra time required is relatively short.

When plants are grown cool, both shoot and root growth are slowed, and plants dry out slower. The amount of water vapor that cold air holds is less than warm air, so cool greenhouses often have a higher humidity than warmer greenhouses. Plant pathogens, especially Botrytis, are typically more problematic under these cool, humid conditions. Therefore, not only do plants grow slower at cooler temperatures, they can also be more difficult to manage. Growers therefore need to weigh these trade-offs and seriously re-consider growing cool, particularly for cold-sensitive crops.

There are many other ways greenhouse growers can reduce heating costs without lowering temperature and jeopardizing cropping time or quality. Examples include plugging greenhouse air leaks, using retractable energy curtains, installing more efficient heaters, and letting air temperature increase on sunny days to offset cooler nights. Much more information can be found on the MSU Greenhouse Energy website, www.flor.hrt.msu.edu/energy, which includes articles written by horticulturists and agricultural engineers. g

Erik Runkle is associate professor and floriculture extension specialist in Michigan State University's department of horticulture. He can be reached at runkleer@msu.edu or 517.355.5191 ext. 1350.