BY ERIK RUNKLE

The Perils of Low (Greenhouse) Temperature

The time it takes to finish a crop is primarily a function of the average daily temperature. Plants develop progressively faster as temperature increases, and likewise develop progressively slower as temperature decreases. When it is especially cold outside, it is tempting to lower the greenhouse temperature setpoint, particularly at night. However, there can be some undesirable and insidious consequences if the temperature is lowered too much, or for too long. This article describes some of the pros and cons that can arise from low temperatures, especially in the greenhouse.

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Slows growth and development. While all plants develop slower when the temperature is lowered, the magnitude of the decrease depends on the crop and temperature. Generally, cold-sensitive plants are delayed more with a temperature decrease than cold-tolerant plants. Cold-sensitive plants are those with a high base temperature (the temperature at which plants begin to develop) and include crops such as angelonia, blue salvia, gomphrena, pentas, portulaca, torenia and vinca. Cold-tolerant crops are less affected by a decrease in temperature and include crops such as diascia, heliotrope, marigold, osteospermum, snapdragon and stock.

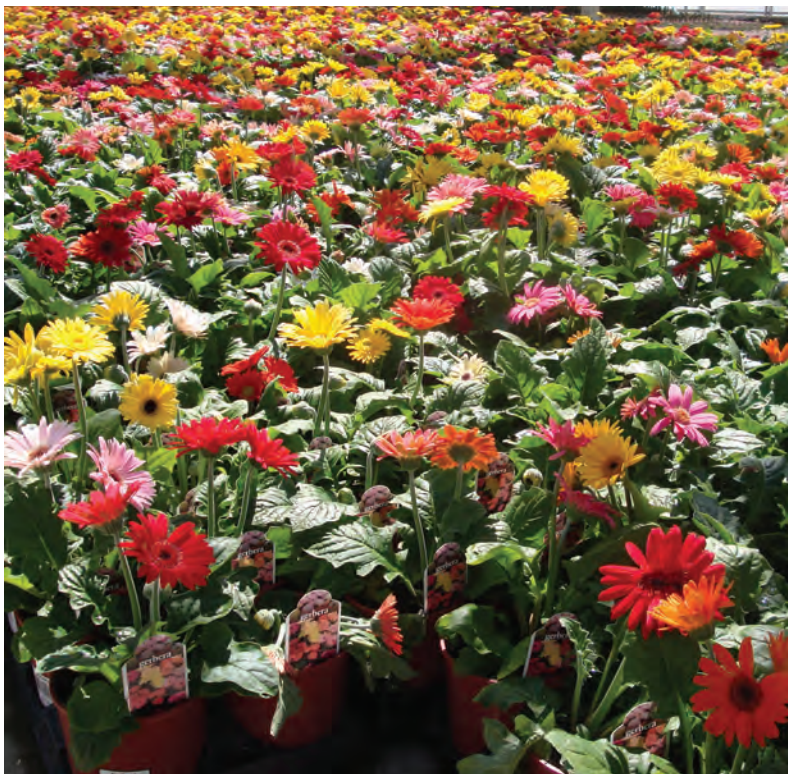

Figure 1. Lowering the greenhouse temperature is useful to hold plants that can't be shipped, but be mindful of problems that can arise if the temperature is lowered too much or for too long.

Useful to hold crops. If the market is not ready to accept plants, the best way to slow down their growth rate is to reduce the temperature (Figure 1). Nearly all crops can tolerate an average temperature of 50° F, and cold-tolerant crops can handle temperatures of 35 to 40° F. The most cold-sensitive crops, such as basil, should not be held below 55° F. When the temperature is significantly reduced, plants should be watered less, but they still need some water. Similarly, plants held at low temperatures don't need as much light, but crop quality can be reduced if given too much shade.

Increases humidity. The amount of moisture that air holds decreases with temperature. For example, air at 68° F with a relative humidity of 50% becomes saturated with moisture (relatively humidity of 100%) when lowered to 57° F. Several challenges can arise when humidity nears 100%: plants dry out slower and leaves stay wet longer, which makes conditions more favorable for pathogens that affect roots and shoots. In addition, a wet media can inhibit rooting, which can be especially problematic during propagation and soon after transplant. Therefore, humidity and moisture management become more important when the greenhouse temperature is reduced.

Freezing or chilling injury. Freezing injury occurs when plants are exposed to temperatures below freezing. While many plants can tolerate temperatures near freezing, many cold-sensitive plants, including plants native to tropical areas, cannot. Chilling injury can occur to plants at temperatures above freezing and as high as 54° F. The potential of freezing and chilling damage increases with the duration of low temperature exposure, as well as the magnitude of the temperature decrease. Damage from low temperature is usually not apparent until after plants are exposed to warmer temperatures for a day or two.

Common symptoms of chilling injury include water-soaked lesions on leaves; a bronzing or browning of leaves, especially on recently developed ones; and wilting. More severe chilling injury can result in collapse of stems and leaves. Generally, young plants (including plugs and cuttings) are more susceptible to low-temperature damage than mature plants. Some cold-sensitive crops develop temporary symptoms when exposed to low temperatures. For example, celosia develops pale green or yellow-green leaves at moderately low temperatures, such as 50 to 55° F. Other plants may develop a purplish color. Freezing injury is more obvious; tissue dies and turns brown or black.

Rooted plants can recover from mild to moderate chilling damage, but affected tissue may have to be removed and additional production time will likely be needed before plants are marketable. However, crops may be less uniform and less vigorous. It is usually best to dispose of and replace young plants (especially nonrooted cuttings) that have chilling or freezing damage. gpn