



By Erik Runkle



# High-Temperature Stress of Bedding Plants

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Temperature and light conditions in a greenhouse vary significantly throughout the year, especially in northern, temperate climates. During the winter, our environmental concerns for greenhouse production typically focus on low light levels, short days and cold temperatures. That changes quickly in late spring and early summer, when successful production of many bedding plant crops requires avoiding extreme heat and very high light levels.


The term “high temperature” is crop-specific and somewhat situational. For cold-tolerant bedding plants like alyssum and pansy, a high temperature can be anything above 68° F. Cold-sensitive plants such as angelonia, pentas, and vinca tolerate warm temperatures better, and temperature stress may not begin to occur until 80° F or higher. When temperatures increase above these values for a prolonged period of time, the rate of leaf and flower development declines and for some crops, photosynthesis is inhibited. As a result, high temperature delays flowering and can lead to reduced growth.

There are some bedding plant crops that tolerate high temperatures quite well. In experiments performed at Michigan State University, the rate of development for crops such as marigold, rudbeckia and zinnia continued to increase even as the average daily temperature exceeded 95° F. Interestingly, petunia showed a similar tolerance to high temperature. Of course, the quality of plants grown at such high temperatures was very low; growth was reduced and flowers were small.

There are some straightforward ways that growers can mitigate high greenhouse temperatures. First, ensure

ventilation is adequate. Side and roof vents should be able to open to their maximum capabilities. For greenhouses with active ventilation, ensure all of the fans can operate at full speed and that there is an adequate intake of air. Completely horizontal fan louvers usually indicate that fans are able to draw in enough air. If you open a door and feel a surge of air when the fans are operating, it's a clear sign that an insufficient amount of air is entering the greenhouse.

If you have a cooling (evaporative) pad system, make sure it isn't too clogged with algae and that water trickles down the pads as designed. I commonly see pad systems that leak a lot of water, only trickle down parts of a pad, or are covered in algae. All of these limit the efficacy of the pad system. Also, when the pad system is operating, roof vents should usually be closed so that the air drawn into the greenhouse is through the operating pads. Otherwise, the benefit of the pad system is mitigated.

Finally, many growers provide shading to help minimize temperature rise in a greenhouse. Although shading is effective, too much of it can reduce photosynthesis, leading to reduced crop growth and lower plant quality. For many crops, the worst combination of growing conditions is high temperature and low light. There are several advantages of a retractable shade system, most notably that curtains can only be deployed when light levels are high, and not on cloudy days. An advantage of whitewash applied to the exterior of the glazing material is that it reflects light outside the greenhouse, before it enters. As a result, less energy enters the greenhouse and the temperature rise inside is reduced. 

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