

GROWERTALKS

Paul's Pointers

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Beating the Winter Blues

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The winter blues have likely already set in for those of us who have been consistently buried in snow and/or subjected to temperatures well below freezing for much of the winter. Have you ever thought about the possibility that plants also experience problems from extended dark periods during the winter months? Although symptoms of winter blues for plants differ from yours, you should be aware that they're also adversely affected by the winter doldrums.

As I've already alluded to, it's not uncommon to have extended periods of dark, cloudy conditions during the winter months and even lasting into or reoccurring in the early spring. Although the structures do provide protection from the outside elements (temperatures, wind, rain and snow), they can have adverse effects on other environmental factors.

Low light intensities

When the natural light intensities outside are low throughout the winter or during extended periods of cloudy weather, the light levels crops perceive inside the structures are reduced even further. The light intensities inside structures are reduced by at least 40% of ambient outside levels. As a result, certain problems could arise. Low light levels adversely affect plant growth and development, as well as several quality attributes of crops being grown inside greenhouses.

When the natural light levels are too low during propagation, growers can expect delayed rooting, non-uniform rooting (variability), lower rooting percentages, less growth due to reduced photosynthesis, thinner and more elongated plants, slower growth and reduced quality attributes. Low light levels also affect crops being produced in the final containers by delaying their development, decreasing lateral branching, reducing the number of flowers produced and increasing stem elongation.

To avoid these quality issues and the effects low light intensities have on crop development and timing, many growers provide supplemental lighting. Lighting is most commonly provided inside propagation houses. The most benefits from supplemental lighting are obtained when it's delivered during the late fall through the late winter (October to March) when the natural intensities are at their lowest. During propagation, it's generally recommended to provide enough supplemental lighting to increase the daily light integral (DLI) to a minimum of 8 to 10 moles per day ($\text{mol}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$).

Applications of PGRs can also be made to young plant material in propagation, as well as to older plants to help reduce the negative effects low light intensities have on plant appearance and quality. I've found it's always best to apply lower, but effective, rates more frequently rather than applying a single, higher rate application. Evaluate the

need for PGRs weekly, taking into consideration the current and anticipated environmental conditions, trying to be proactive, if possible, rather than reactive.

Moisture and humidity

When less-than-ideal growing conditions occur outside, it can make managing the relative humidity and moisture levels inside the greenhouse more challenging. High humidity inside structures increases stem elongation, decreases the uptake of calcium within the plant and results in significantly longer drying times of the moisture on the foliage, in the root zones and on the floors.

High humidity also leads to the formation of condensation on the greenhouse coverings, which often rains down onto the crops below. In addition to increasing plant height and the potential for calcium deficiencies, these environmental conditions often contribute to the occurrence of plant pathogens, including botrytis, leaf spots, powdery mildew and root rots.

Although it can be difficult to reduce the relative humidity inside structures during periods when it's too cold outside to ventilate or when the relative humidity is already high outside, ventilating when possible and running humidity purges is the first and most important management tool you can use to reduce the negative consequences of high humidity. Avoiding excess water on the floors, irrigating early in the day and/or watering only on sunny days are also management strategies that can be used to somewhat reduce humidity levels inside greenhouses.

High humidity significantly increases stem elongation, more than most growers acknowledge or accept. During periods when you can't control or manage the humidity levels, use methods such as reducing the moisture and fertility levels slightly, use negative DIF or DROP, and possibly apply PGRs if additional control is necessary.

Calcium deficiency can be reduced by making foliar calcium applications with products like calcium chloride, calcium nitrate or CalOx to name a few. During dark periods or times when the relative humidity is high, it's beneficial to apply calcium every three to four days and then back down to weekly once sunnier or less-humid conditions return.

The occurrence of diseases can be reduced by managing the environment—this entails reducing the humidity with ventilation, providing good air circulation using HAF fans, placing crops at wide plant spacings (also effective at reducing elongation) and irrigating in such a manner that the foliage doesn't remain wet for long durations. Fungicides can also be applied, preferably at the onset of the adverse conditions, to protect the plants from pathogens.

Winter is long enough and like managing the winter blues, just know that there are a few things you can do inside the greenhouses to keep your plants from experiencing their winter woes. **GT**

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