The best tool for the job

Know your options to choose the optimal greenhouse shading material for your operation. **By Roberto G. Lopez**

Growers can reduce greenhouse light transmission to reduce water loss and plant temperature (heat stress) or for crops that are sensitive to high solar radiation by using shading materials. The two most common shading strategies used in commercial greenhouses to reduce solar radiation are: 1) applying a shading compound to the external glazing and 2) installing one or more layers of retractable shade curtains inside or outside.

Shading compounds

A low-cost method to reduce solar radiation is to apply a shading compound such as whitewash to the exterior of greenhouse glazing material. Shading compounds help reflect radiation before it enters the greenhouse and thus prevents some of the heat from entering. Obtaining a specific or uniform shading percentage can be difficult and labor intensive. Unlike retractable shade curtains, shading compounds cannot be adjusted when they are not needed, such as on cloudy days. Shading compounds should be completely removed from the glazing material during the autumn to prevent excessively low light levels.

Retractable shade curtains

In temperate climates and in most of the U.S., retractable shade curtains are typically installed inside the greenhouse so that they are not damaged by snow, ice or wind **(Fig. 1)**. However, internal curtains allow solar radiation to enter the greenhouse before it is reflected by aluminum strips or other reflective material. This can cause heat to build up above the curtain requiring some sort of roof ventilation. They can be manually operated or programmed to open and close based on time of day, light and temperature set points established with an environmental computer.

Unlike shading compounds, growers can retract the curtains during periods of low light (i.e. morning, late afternoons or cloudy days). Curtains with a closed design can also be used as a thermal blanket on cold nights to prevent the loss of thermal radiation. Depending on the greenhouse structure, one or multiple layers of curtains with different shade percentages can be used based on crop requirements or energy savings.

Shading materials such as black saran can absorb solar radiation, consequently heating the air and plant temperature. This is counterproductive, as the main reason we use shading materials is to reduce air and plant temperatures within the greenhouse.

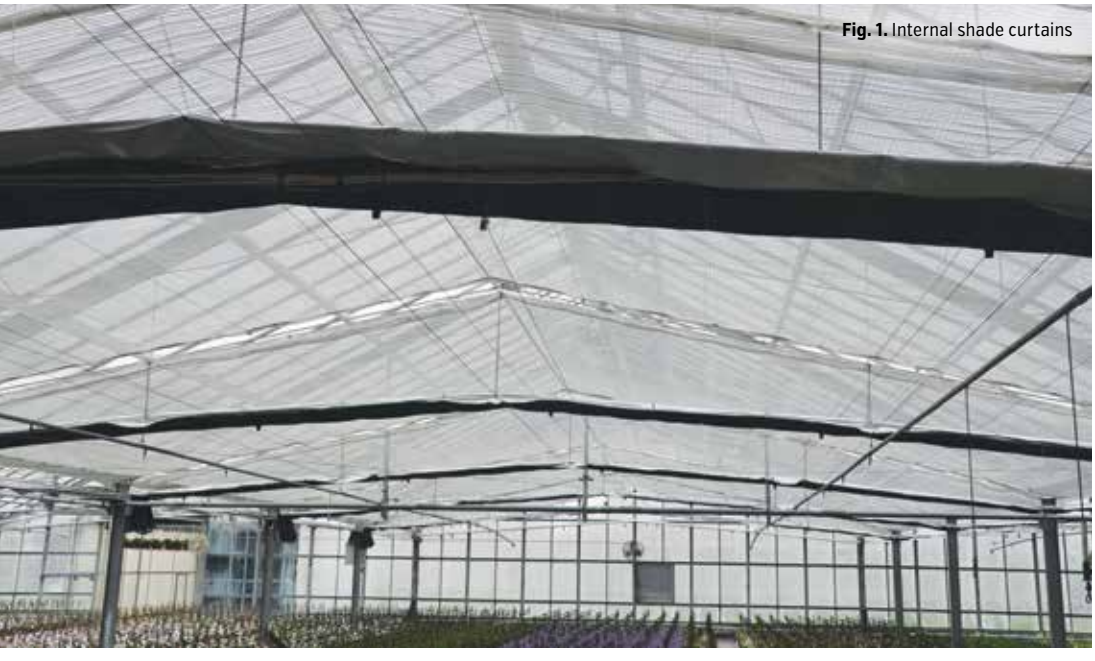

Fig. 1. Internal shade curtains

PHOTO: ROBERTO G. LOPEZ

Shading percentage

The geographic location of the greenhouse, the light transmission of the glazing material and the crops being grown can dictate the percentage of shade that a retractable shade curtain provides. With the exception of low light crops such as Phalaenopsis orchids and African violets, shading should not exceed 40 to 45 percent. The goal is to prevent light intensities within the greenhouse from exceeding 4,000 to 5,000 foot-candles (800 to 1,000 $\mu mol \cdot m^{-2} \cdot s^{-1}$). GM

Roberto is an assistant professor and controlled environment/floriculture extension specialist in the Department of Horticulture at Michigan State University.