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Retractable Blackout Curtains should NOT be used as Greenhouse Shading

In this alert, you will learn about the advantages and disadvantages of using shading compounds and retractable shade curtains to reduce greenhouse temperatures and light levels. A refresher about the negative affects of using blackout cloth as shading will also be covered.

Most growers welcome increased solar radiation as the bedding plant season progresses as it means energy costs for supplemental lighting or heating are eliminated or reduced depending on their location. However, when temperature control is a concern or crops are sensitive to high light, growers begin to use shading.

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 (Figure 1) or outside.

Figure 1. Greenhouse with an internal retractable shade curtain.

Shading Compounds

Growers that are interested in a low cost method to reduce solar radiation often use shading compounds such as whitewash (Figure 2). They are often applied using high-powered sprayers and to a lesser extent, with brushes or rollers. The percent reduction in light transmission or shading factor is based on the amount of compound mixed with water and the volume applied.

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Figure 2. Glass-glazed greenhouse with whitewash on the exterior.

Some of the advantages and disadvantages of using shading compounds are:

Advantages

- Inexpensive
- They can be applied on almost all glazing materials
- They reflect solar radiation before it enters the greenhouse and thus prevent some of the heat from entering
- Does not create permanent shading inside the greenhouse

Disadvantages

- Labor intensive to apply and remove
- Obtaining a uniform or specific shading percentage or shading factor can be difficult
- The shading percentage of some compounds decreases as it is washed away by rain or snow
- Cannot be adjusted during periods of low light
- Can get on crops (Figure 3) if ridge vents are open during application or glazing material is not properly sealed (ie. glass)

Figure 3. Shading compound on the leaves of crops growing inside the greenhouse.

Figure 4. Retractable shade curtain on the interior of a greenhouse.

Retractable Shade Curtains

Retractable shade curtains can be installed inside or outside depending on the climate where the greenhouse is located. Typically, retractable shade curtains are installed inside the greenhouse (Figure 4) in temperate climates where snow, ice, or wind could damage external curtains. External shade curtains are typically used in tropical and subtropical climates where the light is reflected before it enters the greenhouse. In this article we will focus on internal shade curtains as they are the most common across the United States. Ideally, an internal shade curtain will consist of reflective materials such as aluminum strips to reflect incoming light without absorbing solar radiation. Shading materials such as black saran can absorb solar radiation, consequently heating the air in the greenhouse and plant temperature through radiant heat. This is counterproductive as the main reason we use shading materials is to reduce air temperatures.

Shading Percentage

The percentage of shade that a retractable shade curtain provides depends on the location of the greenhouse, glazing material, and crops. With the exception of low light crops

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such as *Phalaenopsis* orchids and African violets, shading should not exceed 40 to 45%. Some of the advantages and disadvantages of using retractable shade curtains are:

Advantages

- Can be retracted as needed
- Can have multiple layers of different shade percentages based on crop requirements or energy savings
- Curtains with aluminum strips reflect radiation with minimal absorption
- Can also be used as an energy curtain to help retain heat at night

Disadvantages

- Cost of material and installation
- Orientation can influence uniformity of light across the crop
- Selection of curtain material (open or closed construction) depends on greenhouse ventilation
- Black saran absorbs light and does not reflect it

Blackout Curtains

Retractable blackout curtains are commonly used in commercial greenhouses for daylength control where the grower is either trying to induce or prevent flowering. In some recent greenhouse visits, I have seen several growers using partially open blackout curtains as shade curtains (Figures 5 and 6). Blackout curtains make poor shade curtains for several of the reasons previously mentioned in this article. They can absorb heat (even if the outside layer has aluminum strips), they provide a large shading percentage to the crops directly below (even if they are partially open) and create bands of light throughout the greenhouse. High temperatures and too much shade can decrease crop quality, growth, and development (heat-delay). In the greenhouse where Figure 5 was taken, the air temperature was significantly higher than adjacent greenhouses where no shading materials were utilized. Again, the use of the blackout curtains during the middle of the day was counterproductive as their use actually created a warmer environment. Additionally, plants directly below

Figure 5 (left) and Figure 6 (right) Spring and fall production greenhouses using blackout cloth as shade cloth. As a result of using blackout cloth there are very dark shadows and bands of high light that result in plant stress and non-uniform crop growth.

the areas where the blackout curtains are retracted (open) receive much higher irradiance than their adjacent neighbors under the blackout curtain (Figure 7). This can cause plant stress and watering challenges for the grower as the crop will not dry down uniformly (Figure 8). Therefore, if you have blackout curtains and need to provide shading, your best approach is to use a shading compound.

References

Heins, R.D. and E.S. Runkle. 2004. Materials and strategues for greenhouse shading, p. 39-42. In: P. Fisher and E.S. Runkle (eds.). Lighting Up Profits.

Figure 7. Dark shadows and bands of very high light over a kalanchoe crop grown under blackout cloth.

Figure 8. Dark shadows and bands of very high light over a poinsettia crop grown under blackout cloth create irrigation challenges for growers. Leaves are beginning to wilt under the bands of high light.