GROWERTALKS

Features

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Diffuse Light for Better Plants

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It's not a new concept, but as the industry increasingly becomes aware of diffuse light and its benefits and potential, researchers are pressing to quantify the gains it can provide. In particular, the premise that when diffuse light can be deployed at will, such as via a retractable screen, more light can be brought into the greenhouse. This can, of course, significantly affect multiple factors in greenhouse production.

Pictured: Greenhouses with light-diffusing screens received light treatments of 10 mol PAR/m2 per day and 7.5 mol PAR/m2 per day, and saw shorter production times and better quality than those with standard screens.

In addition to impacting efficiency through lower heating and cooling expenses, diffuse light can have a significant positive impact on plant quality and productivity. In fact, so interested are researchers at the Netherlands' Wageningen UR Greenhouse Horticulture that they've embarked on a multi-year study examining its benefits.

"Sunlight is free. Why would we not use it?" says Leo Marcelis, lead researcher of the WUR. How? "Diffuse."

The first study yielded impressive results, finding that producing various varieties of commercial potted plants under a light-diffusing screen could shorten the production time by 25% and result in better-quality plants.

Setting the stage

The research stems from scientists' belief that the best greenhouse coverings scatter the light, but don't reduce it. Previous research at Wageningen UR Greenhouse Horticulture found that during darker parts of the year—such as November—greenhouse films and coverings reduce light transmission and diffuse light doesn't make up for it.

Thus, the study compares a greenhouse with a standard greenhouse screen to greenhouses with light-diffusing screens, like Harmony Revolux XLS 55 F from Svensson. All of the greenhouses were also

equipped with Svensson energy screens and had standard glass on the greenhouse roof.

The base or control greenhouse allowed a maximal light cumulative per day of 5 mol PAR/m2 with a shade that transmits mostly direct (unscattered) light. The two greenhouses with light-diffusing screens received light treatments of 7.5 mol PAR/m2 and 10 mol PAR/m2—50% higher than the normal light levels most growers use.

Each greenhouse zone was approximately 150 m2 (1,615 square feet). In them, researchers produced pot plants, in this case bromeliads (Guzmania Rana and Vriesea Miranda) and anthuriums (Royal Champion and Pink Champion). (The next phase of the study, now underway at the WUR, is studying trials of diffuse light's benefits on Phalaenopsis orchids.)

Greenhouse climate was closely monitored, and misting systems kept humidity levels relatively high. Researchers use a high-tech plant activity meter monitoring system, which they developed, to measure photosynthesis and assess whether plants are under stress or if damage is beginning to occur.

Greenhouse	Shading screen	Maximal light cumulative [mol/m^2 day]
Reference growers	XLS 16 F REVOLUX or similar	5
1	XLS 55 F HARMONY REVOLUX	7.5
2	XLS 55 F HARMONY REVOLUX	10

Results shed new light

Anthurium potted plants produced in light-diffused greenhouses equipped with Svensson's Harmony screens were ready for sale at 16 weeks compared to the normal 22 weeks, says Leo. In other words, production time and growth rate were 25% faster than normal. Plants were also notably better quality, with plants in the 10-mol greenhouse 25% heavier than typical.

Production of the bromeliad varieties Guzmania Rana and Vriesea Miranda was also sped up, with both ready two to four weeks earlier than the norm. Plants were also notably heavier and larger size than normal. To achieve the earlier finish time, researchers recommend performing the flowering treatment two to four weeks earlier than usual. In addition, thanks to the higher growth rate, researchers noted the interesting development of increased side shoot growth on the Vriesea. They anticipate that adjusting temperature and plant intensity will offset this.

"The results are clear: Allowing more light and while applying the light-diffusing Harmony shading screen, together with an adapted climate strategy, results in 25% growth speedup and a higher quality of pot plants," says Paul Arkesteijn, Climate Performance Analyst of AB Ludvig Svensson.

Even with the high light levels, researchers reported no damage to plant leaves, as would be expected with high levels of direct light. Instead, diffuse light lets growers allow more natural light into the greenhouse, without risking plant quality—on the contrary, diffuse light positively affects both quality and growth. The best solution: diffuse light when you need it, with an on-demand, movable curtain.

> ## What is Diffuse Light?
> Diffuse light is scattered by particles, so it appears to come from all directions. Compared to direct light, it is much more soft and penetrates much more deeply, such as through the thick canopy of a plant. This better coverage of the canopy activates more photosynthesis,

> translating to better growth. Light is more evenly distributed with fewer shady spots and hot spots. **GT**

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