

Climate Control

BY MAURICIO MANOTAS

North America Dips Into Double Screening

Is it worth adding multiple screens to your greenhouse?

To European flower growers, double screening is old hat. But while double screening has come a long way worldwide, it's far from the norm around here, with the possible exception of our flower-producing friends in the west. The vegetable industry in particular has been slow to adopt, because while flowers are all about quality, veggies are also all about volume.

As competition increases, climate conditions change and input costs rise, vegetable producers are coming to realize that as long as you have the quality, it's important to invest no matter what the cost.

Likewise, floriculture growers are increasingly investing in double and even triple screening. A 10-acre gerbera production range in British Columbia, Canada, just installed a state-of-the-art double screening system.

But what does double screening really mean for your production practices? And is it worth it? Recent research puts even more emphasis and results behind the positive impacts of integrating multiple screens in your production greenhouse.

Instant energy savings, plus a productivity boost

A single screen allows cold air to drop into the crop quickly and shuts down the crop for a few hours before it returns to active growth stage. Double screens provide a buffer, so you can avoid having cold air come into the crop early in the morning.

Double layers also offer an instant impact on energy costs, as grower Arno Bross found out at Het Wilgenbos in Bleiswijk, the Netherlands. Facing rising gas prices, Arno added a second layer of highly transparent screens in his 7.2-hectare (17-acre) greenhouse last year.

"The second screen was especially useful in the spring when night temperatures sometimes dropped," he says. "When it did, we closed the second screen to prevent the plants from getting too stressed."



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During winter nights Arno closed both screens, even when the weather was mild. His pepper plants were lit using 4,000-lux lamps starting at 2:00 a.m., with one screen open to prevent the greenhouse temperature from rising too high. The first year with double screens saved Arno 3.5 m³ per m² of gas.

A two-year research study in the Netherlands and Belgium with double screening also demonstrated energy savings, along with the added benefits of higher yields and better quality. Fifteen eggplant growers participated in the project, which equipped trial greenhouses with two horizontal air hoses at the top, connected to two air-handling units that can dehumidify the area under closed screens. It includes Verti-Fan vertical recirculation-units and a double screen.

The results were undeniable.

"In the trial greenhouse we went from 1,500 to 2,000 screening hours to 4,500 hours with a single screen and 3,500 hours with the second screen. Screening in the reference greenhouse increased to 4,000 hours," says Frank Groenewegen of Greenbrothers Nursery in Zevenbergen, the

Netherlands. Average commercial greenhouse gas consumption is 34 m³/m²; in their trial greenhouse, it was just 24.7 m³. In addition, fruit development was 10% to 15% faster than previously recorded: 18 days instead of 21 days in the trial greenhouse.

The flexibility to grow

Dick van Noord, who produces cocktail tomatoes in the Dutch province of Zeeland, has also reaped the benefits of double screening in his operation. In one 4.7-hectare (11-acre) greenhouse, he uses two transparent screens, polycarbonate paneling and has dehumidification units in the wall.

"Having two screens creates more possibilities to play with the light and climate than a single screen. The screen is not diffuse, so I get a lot of light early in the morning and evening when the sun is at a low position," says Dick. "Light transmission is maximal and that, of course, is very interesting."

Managing light and heat played largely into design and engineering at one of the United States' first major double screening operations, as well. Nature Fresh Farms currently has a 15.3-acre range under construction in Delta, Ohio, incorporating a blackout screen on top for light remediation and, on the bottom, a reflective screen that reduces condensation.

"We wanted the blackout for light pollution and also the energy savings for winter," says John Ketler, general manager for Nature Fresh. "In the cold winter months, we'll be able to close only the bottom woven screen during the day and still get light transmission."

Nature Fresh, which also operates a 132-acre pepper and tomato range in Leamington, Ontario, Canada, has big plans for the Ohio Fresh location, as it's been coined. It's the largest proposed greenhouse facility in North America, projected to reach 175 acres in 12 phases over the next seven



Aerial shot of Nature Fresh Farms' new facility in Delta, Ohio. Double screening will play a key role at the new Ohio range.

years. The facility will produce tomatoes for the Midwest, with another 30+ acres slated to come online by late 2016.

Double screening will play a key role in Nature Fresh continuing to deliver their signature quality and productivity at the new Ohio range—an extension of early success they've seen with double screening at their Leamington operation. After replacing 15 acres of existing shade curtains with one shade and one light transmission screen next to 15 acres of single curtains in the same greenhouse, they compared plant temperatures.

"We wanted to get away from shading and this helps us diffuse and shade. We were able to achieve a (39F) 4C reduction in plant temperature in the heat of summer," says John, who explains that's significant because Leamington's steamy temperatures can quickly send plants into shutdown

mode, where they stop transpiring. That impacts quality, causing drops in fruit size. Double screens offer the potential to stop that, plus save in other areas like irrigation and possibly shorten production time.

"This tells us we can push our plants harder, go with higher daytime and lower nighttime temperatures early," says John. "We'll have better control of the size of our fruit in summer because we know the plants are being more active."

Tweaking production practices

Will double screening change your growing practices? Yes, for the better, with multiple small reductions. You'll also change your use of traditional solutions, for example, foregoing whitewashing, a more fixed solution, for the more flexible option of retractable screens that allow you to add and subtract light at will.

You'll want to be more in tune with your irrigation and how your plants are taking in nutrients. It's definitely a more hands-on approach.

And you'll want to pay close attention to humidity, says John, and understand what potential humidity issues you may have to combat in your greenhouse.

"During the main growing season, we're always working with the two curtains to reduce the possibility of high humidity leaking from the curtains and the roof," says John. "You want to work your curtains precisely, gapping, opening them up the right way to reduce your humidity."

However you choose to use double screening, the results more than come back multi-fold. **GT**

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