

While Horti Fair has witnessed the advent of numerous companies from around the world touting LED lighting technology for the greenhouse sector, it seems that Dutch lighting giant Philips is leading the way in both research and real-world installations of this emerging technology. Proof of that? During Horti Week, Philips arranged a one-day bus tour for interested parties to see four commercial LED installations in the north and west of Holland.

by Chris Beytes

## Tour highlights real-world LEDs

On Thursday, 3 November, some 40 or so interested attendees from China, Japan, Canada, the UK, Finland, Ukraine and the United States joined a strong contingent of Philips staff to visit four commercial greenhouses, which ranged from cut roses to Kalanchoes (along with the Improvement Centre and Tomato World). The goal was to show a wide range of LED installations and uses in commercial settings—proof that LEDs are moving out of the laboratory and scientific installation and into the real world. Attendees ranged the gamut, from academia, research and consultancies such as Shanghai Jiatong University in China and Horticultural Development Company (HDC) in the UK; to manufacturing firms such as Conviron in Canada and Shanghai Dushi Green in China; to growers like Kagome in Japan and Robbes in Finland. All were eager to learn more about Philips' light-emitting diode research. Here is a recap of our tour stops.



Niels Kreuk shows how cut tulips are grown on water in container benches under LED lights.

### Kreuk Tulips

Cut-tulip grower Niels Kreuk is moving up in the world—literally. The business's new 1,500 m<sup>2</sup> glasshouse in Andijk may be the smallest new installation in the Netherlands in recent years, but it actually equals almost three times that space, because Kreuk will be stacking three layers of tulip bulbs for cut tulips in the house.

The glasshouse features a multi-layer internal transport system by Frans Van Zaal. A transport cart/elevator in the center aisle lifts containers in and out of the three layers. Strips of Philips LED lights illuminate the tulips in the first two layers; natural sun takes care of the top layer of plants.

An interesting aspect of Kreuk's LED installation is that the blue LEDs in the red/blue recipe have been coated to make them provide white light, for employee visibility and comfort. However, the plants still see the light as blue.

The purpose of building a greenhouse up instead of out? Energy savings (as well as land utilization). It will be considerably less expensive to heat a 1,500 m<sup>2</sup> house than one three times that size, even though, at 7 meters high, the house is somewhat taller than a standard greenhouse. Niels added that, including the multi-level bench system, construction cost was 25% less than a single-layer house with the same output capacity.

In other words, this multi-level technology basically has growers thinking in terms of cubic meters of growing space rather than square meters. |||

### Kwekerij Vreugdenberg

Next stop was in De Lier in the heart of the Westlands, at Kwekerij Vreugdenberg, a Kalanchoes specialist.

Here, the goal with LEDs was two layers of Kalanchoe production. They wanted to see if they could grow plants beneath their existing internal transport system, basically doubling the output of an existing greenhouse. Of course, the plant quality would have to remain just as high with the below-bench plants as regular plants.

This took a combined effort with both Philips for the LED technology and potting media provider BVB Substrates, as the plants grown under LEDs exclusively are under less stress than those in the sunlight, so changes in irrigation and fertilization are necessary. Vreugdenberg worked through the details in a small test under six of their container benches. They found that in the winter, they shortened the growing time by a full week. And as mentioned, in summer the plants grown under LEDs suffer less stress than those grown naturally. |||



Test block of LED-illuminated Kalanchoes under existing container benches. Quality is said to be equal, and crop time even faster depending upon the time of year.

### Peerdeman Orchideeën, Andijk

Peerdeman was Philips' first commercial LED research project. An orchid breeder, they produce 6 to 7 million young plants per year in 250 varieties in 1.6 hectares, all from tissue culture.

Before LEDs, owner Arjen Peerdeman says, they required about 500 m<sup>2</sup> to grow 650,000 plants from the tissue culture stage to the potting stage. Looking to increase their production efficiencies, they began testing multi-layer production of TC plants using LEDs between the layers for lighting.

Working with Philips and their GreenPower LED Strings, they developed the correct recipe of red and blue LEDs to optimize plant growth in this stacked system. Now, they can produce 425,000 plants in 54 m<sup>2</sup>—so a major gain in space efficiency. Plus, energy usage is cut in half. There may also be some benefits to the orchids; Arjen says the plants show some signs of having more active root tips, although that's just anecdotal right now. |||



Difficult to photograph, but these LED strips provide light to the new shoots, boosting cut rose production by a reported 10%.

### Marjoland Roses

In roses as in vegetables, the LED trend is "interlighting"—hanging lights between the rows of plants to provide light deep into the plant canopy where sunlight or overhead supplemental lighting does not reach.

Wanting to ensure there's still room for Dutch-grown roses, Marjoland, in Waddinxveen, is focused on technology and energy efficiency. A major producer (60 million stems per year), Marjoland already has one of the most sophisticated two-level rose-growing greenhouses in the Netherlands. Now they are testing LED interlighting in conjunction with standard overhead Son-T lamps to see if they can save energy while improving crop output and quality.

After a year of testing LEDs on 1,000 m<sup>2</sup> of the variety 'Passion', they believe they are seeing a 10% increase in flower production on the test block. That is due to more light on the new branches as they form, they think. "With conventional lighting, too little light gets to the lowest leaves, where the new shoots are produced," says Daniel van de Nouweland, who is supervising the test. "The interlighting modules get light to the places where this was not previously possible." |||



Close up of the red and blue LEDs in strips that make up the "recipe" determined to be optimum for orchid young plants.

## Lending a Hand

Implementing a major new technology, especially one that is still in the development stage such as LED lighting, requires a major financial investment. But as you are well aware, banks are less eager to lend money for horticultural projects than probably at any time in history. That is where Philips Lighting Capital comes in.

As a corporation, Philips has long helped customers finance installations of their equipment. And uniquely, they link the financing to the returns they say the investment in their technology will return to you. The service now extends to horticultural clients and projects like described above.

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