



**PHILIPS**

Horticulture  
LED Solutions

Case study  
Delphy Improvement  
Centre

Bleiswijk, the Netherlands



Philips GreenPower LED toplighting  
Philips GreenPower LED interlighting

**Peak yields for tomatoes**  
grown with LEDs

“With full LED we can optimally steer lighting and plant temperature”



“

With LEDs we can apply **the maximum growing light to achieve peak yields of over 100 kilograms per square meter.**”

**Willem Valstar**, adviser StarGrow Consultancy



### Background

Delphy Improvement Centre is a modern greenhouse complex where new cultivation techniques and technical systems from all parts of the world are developed, tested, and demonstrated. Results contribute to sustainable and profitable horticulture around the world. This research company carries out trials on a practical scale. It brings together results from fundamental research and the practical experience of growers. Delphy has done previous growing light trials with combinations of Philips HPS and Philips GreenPower LEDs and Philips GreenPower LEDs alone on tomato and strawberry crops.

### The challenge

The big challenge in growth light trials with tomatoes is achieving the highest possible yields, and that requires extensive research knowledge and practical growing experience. The trials aim to combine the most advanced climate control and growing light technologies and also serve as demonstration areas. The large truss tomato, Komeett, has been tested in the past few years.

The first trials were done with a combination of Philips HPS lights and Philips GreenPower LED interlighting. Together, they produced a light intensity of  $220 \mu\text{mol}/\text{m}^2/\text{s}$  and represented the new way of growing and reducing energy. Using Philips HPS lighting is a standard horticultural practice. Early trials with Philips GreenPower LED interlighting confirmed the potential of hybrid grow light systems. It was expected that results from the next trials, combining Philips GreenPower LED toplighting with Philips GreenPower LED interlighting, would equal or exceed the early trials.

### The solution

In the 2013/2014 growing season, a trial with Philips GreenPower LED toplighting and interlighting was set up in one section. This trial involved three lighting set-ups which produced a combined light level of  $210 \mu\text{mol}/\text{m}^2/\text{s}$ . Crops in set-up 1 received toplighting alone, crops in set-up 2 received toplighting and a single line of interlighting, and crops in set-up 3 received toplighting and two lines of interlighting. Plant Specialist Piet Hein van Baar, from Philips says, “We investigated which lighting strategy would produce the

highest yields, as a basis for future research.”

The yields of the best treatment in this trial was 92.5 kg/m<sup>2</sup> through week 40. “We gathered a great deal of information from this trial and learned in particular much more about the possibilities with one hundred percent LED,” says van Baar.

In the 2014/2015 growing season, a follow-up trial was done with the most promising combination:

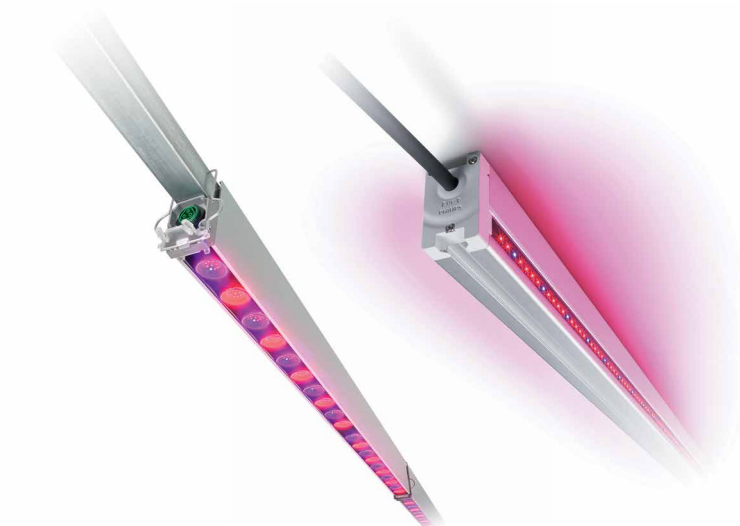
104 µmol/m<sup>2</sup>/s LED toplighting combined with two rows of interlighting, each producing 53 µmol/m<sup>2</sup>/s. The trial started in week 41 three weeks earlier than in the previous year. Unlike the previous trial, the follow-up trial used pinched grafted plants instead of one-on-one grafted plants? The spacing was 4.2 stems per square meter. This resulted in 97.1 kg/m<sup>2</sup> with a limited watering regime and 100.6 kg/m<sup>2</sup> with a standard watering regime

### Benefits

By far, the biggest advantage of the LED toplighting and interlighting combination compared to HPS lighting is the fact that the light penetrates deeply into the crop. This allows both the leaves and the fruit to receive enough light for strong growth. Adviser Willem Valstar, who managed the trial says, “With full LED we can optimally steer the lighting and plant temperature, so the plant does not experience unnecessary stress and thus grows better. The climate also remains more stable and the CO<sub>2</sub> is used more efficiently.” The low radiant heat of the LEDs compared to HPS also makes it possible to extend the lighting season. In practice, growers who use just HPS lighting are limited in their amount of lighting hours from 1 March on. With LEDs, they can extend the lighting period to provide additional lighting on dark days and to maintain constant growth. With the LED interlighting, it’s possible to use lighting for the entire summer for a few hours in the morning, except for extremely hot days when warmth is not desirable. Valstar says, “In this way, we can apply maximum grow lighting to achieve top yields.” An additional advantage is that tomato plants display less leaf scorch with LED’s.

“

With the LEDs we can use the grow lights much longer, even during the summer.”



## Facts

### Horticulturalist/grower

Research Facility Delphy Improvement Centre

### Sector

Vegetable cultivation

### Crop

Komeett Tomato

### Location

Bleiswijk, the Netherlands

### Solution

Philips GreenPower LED toplighting and interlighting

### Philips LED Horti Partner

Certhon

### Results

Higher yields in winter and spring, good quality and taste



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