



Backgrounder

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Philips, at the forefront of LED lighting, horticulture and City Farming

Global food supplies face unprecedented challenges. Changing demographics, land-use, tastes, habits and attitudes have created a need for a new method of food production to meet the challenges of the twenty-first century.

On the demographic front, we face a fast growing global population and a greater proportion of that population inhabiting cities. UN research shows that by 2050, the world's population will have grown by another 2.3 billion and 66% of the world's population will inhabit cities. In addition to this, 80% of the world's agriculture appropriate land is already in use and more extreme weather patterns are putting pressure on conventional farming.

Consumer habits and attitudes also bring their own unique challenges. Increasingly, we expect our favorite foods to be available all year and at an affordable price. Strawberries are no longer just a summertime treat! Yet, despite this, environmentally conscious consumers also worry about "food miles" – the distance food has travelled to reach your plate. They also worry about the resources used up by food production, as well as the use of pesticides. How can these competing priorities be resolved?

Space

So we need to grow more food to provide for the growing demands of people in urban areas, but there is less space available for agriculture. Technology provides the answer to help solve these challenges and a part of the answer is light. Philips' knowledge of plants and light can help usher in a new era of City Farming, where food is grown locally in limited spaces without natural daylight.

Philips has led research into horticultural lighting technology for decades and the new Philips GrowWise City Farming Research Centre will continue this important work. The focus of current research activity is to optimize produce already grown in City Farms, such as salad and lettuce, as well as developing new methods for growing staple foods such as potatoes. The new found ability to grow carbohydrate containing foods in or close to urban areas could help to tackle global food shortages.

Philips GrowWise City Farming - Local food on a global scale

While Philips Horticultural Lighting has been supporting traditional horticultural food producers that utilize greenhouses for decades, City Farming is a very recent innovation. City Farming is a sustainable, reliable and scalable indoor vertical farming system that produces high-quality vegetables, herbs and fruits all year round - in all environments. It bundles a unique combination of

LED light solutions, dedicated growth recipes for specific crops, careful climate monitoring and regulating equipment plus all the necessary engineering, logistics and support required for constant, uninterrupted production.

Philips GrowWise CityFarming allows growers - who could be city farmers, supermarkets, food companies, or even restaurants - to produce food, on an ongoing basis, extremely close to where it will be consumed. This leads to a vast reduction in transport -related damage and perishing of delicate products like lettuce, herbs and strawberries.

Being a closed system, Philips GrowWise City Farming isn't affected by storms, temperature extremes, drought, seasons or - of vital importance - insects. Pesticides are therefore no longer necessary. In addition to LED lighting, only an absolute minimum of fertilizer and water (both to grow and wash the crops) is required. The result is increased yields, reduced operating costs and maximum nutrition and taste.

Because of the carefully-controlled nature of the growing cycle, new possibilities emerge too; for example boosting levels of nutrients and vitamins in crops, improving taste and even developing new varieties. City Farming has the potential to drive fundamental changes in the way fresh food is grown, brought to market and enjoyed by consumers.

Philips technology is already supporting City Farms: Deliscious in the Netherlands and Green Sense Farms in the USA. (see appendix)



Light Recipes help you get the best crops

Philips is committed to helping growers get the maximum benefit from their LED lighting systems, by developing tailor-made lighting recipes which ensure that each product is getting the right light for its needs. A Philips lighting recipe includes: the type and number of LEDs required; where to place them to deliver the optimal lighting conditions; the amount of coverage for the plant type and greenhouse set-up; how bright the lights should be; and when they should be switched on and off.

Philips works closely with scientists and leading academic institutions to understand lighting's impact on plant physiology. This type of research, along with working directly with growers, allows Philips to not only understand a grower's needs, but also how LED lighting can go even further.



The evolution of horticultural lighting

Philips has been offering dedicated horticultural lighting solutions to professional plant growers since 1936 and continues to do so. For years artificial lighting has supplemented natural daylight in greenhouses and, therefore, extended the growing season.

Over the years, research has shown that plants' sensitivity to light is very different to humans. Light can have many colors, which are defined by the so-called wavelength of the light – from infrared light with a relatively large wavelength, to ultraviolet with a much smaller wavelength. Plants only make use of certain wavelengths, some of which are non-visible to humans, and different plants respond to different sets of wavelengths. Traditional lamps did not provide ideal conditions for growing, but LED lighting can amplify the impact of horticultural lighting. Philips is the global leader in LED lighting and the company is using its leadership to bring leading LED solutions to traditional greenhouse growers, as well as the emerging City Farm market.

LED Lighting - The future of fresh food production

With the advent of LED technology Philips is able to meet a grower's unique needs. LEDs are highly efficient, produce light in very pure colors (i.e., with a narrow spread of wavelengths) and are available in varieties across the visible and invisible spectrum from far infrared to ultraviolet.

LEDs allow us to optimize lighting solutions to bring even greater value for growers – whether that is higher yields, lower running costs or more control over when plants are ready to go to market. By choosing different types of LEDs, you can very specifically define the spectrum of light plants receive – so there are no wasted wavelengths. Also, LEDs run cool, so they can be placed very close to the plants, ensuring complete illumination of the plant with no shadowing and no danger of scorching. They are also completely controllable – you can turn them on and off, and change the brightness as you wish.

APPENDIX – case studies

Green Sense Farms

Philips has partnered with a Chicago-area commercial grower, to develop one of the largest indoor commercial farms using LED grow lights tailored to their specific crops. This innovative farming model allows them to harvest 20-25 times a year by using 'light recipes' optimized for their produce, using 85 percent less energy. The result will be an increase in crop yields and reduced operating costs, while providing consumers with locally grown, fresh vegetables throughout the year. Different plant types have different light needs and working with forward thinking growers like GSF, Philips is building up a database of 'light recipes' for different plant varieties. GSF is using vertical hydroponic technology with Philips LED growing lights, enabling them to do what no other grower can do: provide a consistent amount of high quality produce, year round. GSF has invested millions of dollars to renovate and equip a million cubic foot indoor growing area consisting of fourteen 25 foot tall growing towers in two climate-controlled grow rooms, which use Philips energy-efficient LED solutions tailored to their specific crops. This method also eliminates the need for harmful pesticides, fertilizers or preservatives, resulting in produce that is organically grown and virtually chemical free. By growing crops vertically, GSF are able to pack more plants per acre than a conventional farm, which results in more harvests per year. GSF produces little waste, no agricultural runoff and minimal greenhouse gasses because the food is grown where it is consumed.

Deliscious, The Netherlands

Dutch lettuce producer is using a Philips LED lighting solution to grow lettuces from seed to full-grown plant within a closed environment cell. The cell contains seven lettuce growing layers, one on top of another – allowing Deliscious to grow more food in a smaller area. What's more, the LED lighting system reduced water and pesticide usage.

Alain Lutz, Belgium

Belgian strawberry grower switched from a standard incandescent lighting system to one based on Philips GreenPower LED Flowering lamps and a tailored light recipe. Not only is he using 85 percent less energy, he is also able to start harvesting strawberries earlier - in February and March, rather than May.

Jami, The Netherlands

Improved temperature control is also a big plus for Dutch tomato grower. They are combining overhead high-pressure sodium lamps with LED lamps hung among the crop to illuminate the lower parts of the plants which would otherwise be in shade. The LED lamps operate at 35 °C, so can be placed close to the plants without damaging them but also add a little bit of warmth – which that particular tomato strain thrives on. And the controllability of the LEDs means more control over the temperature, lengthening the tomato season to all year round. Jami has seen its energy bills fall by 10%, while yields have risen by 35%.

More information about horticultural lighting and City Farming:

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