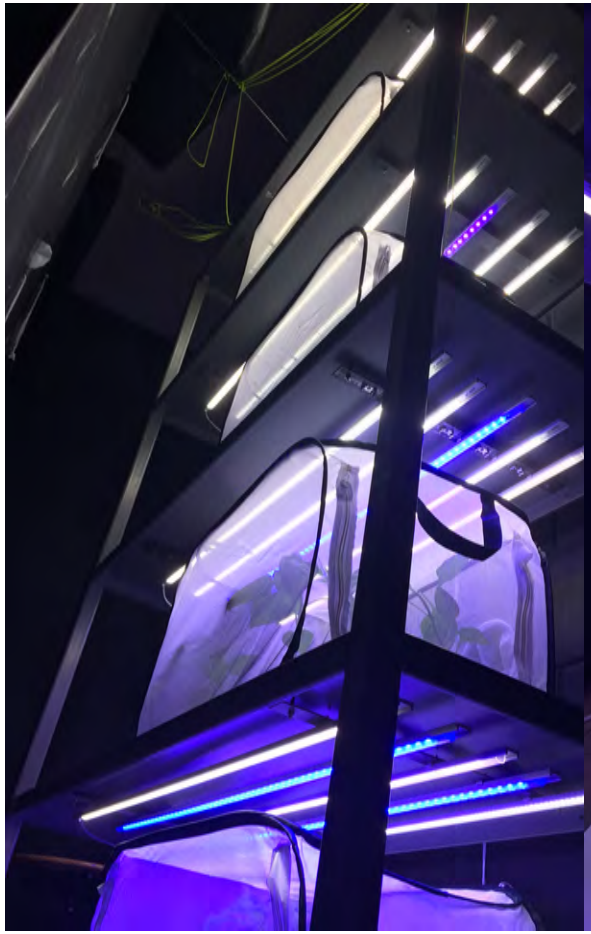
LEDs, an eco-friendly solution to crop pests

LEDs, an eco-friendly solution to crop pests



LEDs, an encouraging solution for crops

Light-emitting diodes (known as LEDs) are on the rise. In fact, in the horticultural sector, more and more professionals are looking for eco-friendly alternatives that are less damaging to health and the environment than chemical treatments. LED lighting, characterised by its low energy use, a narrow spectrum of light frequencies and its ease of use, seems to be a very encouraging solution to limiting the infestation of greenhouses by crop pests, depending on of their responses to light.

LED lighting is known for its economic benefits. Indeed, it offers an intense light while using little energy and its lifespan is greater than that of traditional lights. Its applications today extend beyond just private uses. Industry has known of the benefits of LEDs for several years, as have research centres and farms (fruits, vegetables, etc.), who now frequently use it regularly to optimise the conditions for their experiments and their crops.

How does it work?

The light spectrum is the set of light waves, of various wavelengths, that make up a palette of colours. The human eye perceives "visible light", that is, a portion of the light spectrum ranging from violet (400 nanometres) to red (700 nanometres). Its highest sensitivity is centred around the green part in the middle. Conversely, most insects do not see like us and their eyes have a different response to light. Insect eyes use three types of photoreceptors that exhibit peaks in sensitivity in the UV, blue, and green.

Insects, therefore, react differently to different colours and LED lighting can help precisely target these parts of the spectrum to induce a specific response in them.

In practice, by using a wavelength that repels insects or limits their movement, it is possible to prevent them from attacking the crops in a greenhouse. Conversely, LED lighting that has a wavelength that attracts insects can be used as a "light trap" and, therefore, a way of getting rid of them. This latter phenomenon is referred to as positive "phototaxis", which means the movement of an insect towards a light source. This sensitivity to certain wavelengths is also often used to trap harmful insects such as moths or beetles in covered crops.

Promising experiences for greenhouse cultivation

Interesting experiments have been performed by the Haute Ecole Provinciale Condorcet du Hainaut (Ath, Belgium) in collaboration with the company Colasse in Seraing, which supplied the lighting systems necessary for the experiments (Vegeled LED strips). These took place within the framework of the Novallia call for innovative projects.

The first experience involved the cultivation of strawberries, which is booming in our regions. Strawberry production is often affected by the presence of thrips. To reduce their harmful effects, the grower usually uses predatory bugs (e.g. Orius laevigatus). However, these bugs, just like their prey (thrips), have shown a particular attraction for certain wavelengths in the laboratory. A lighting system has been developed and has made it possible to show great opportunities to manage this pest in strawberry crops, in particular by promoting the attraction of bugs to trap plants.

The experiments also had interesting results on the aphid Myzus persicae which is a major pest of horticultural crops, especially peppers. It was demonstrated that a low UV environment decreases the movement of this aphid because it experiences difficulties in locating itself in space. Other wavelengths, however, blue and green, seem to attract it, and these are a major component of sunlight reflected off the plant and which attract the insect to land and encourage it to eat.
The micro-hymenoptera parasitoid of the aphid Aphidius colemani has also been studied and tests have shown that certain wavelengths directly influence its behaviour and allow better control of the aphid population on crops.

These last two discoveries open up new avenues for the management of aphids in covered culture or even for the production of micro-hymenoptera in the laboratory.

The importance of maintaining a holistic view

However, it is essential to ensure that the plants, as well as the living creatures beneficial to crop growth in the greenhouse are not weakened or even destroyed by the targeted use of these wavelengths. Precise studies performed repeatedly, under real-world conditions, are therefore necessary and recommended to best calibrate this new use of LED lamps in these greenhouses.

In conclusion, optimising greenhouse productivity while ensuring crop quality is a delicate balance that can be achieved through the use of artificial LED lighting.

With this in mind, Colasse is now looking for partners in the development of eco-friendly solutions for pest control in real-world conditions, thanks to its LED Vegeled technology.

Want to know more?

Haute Ecole Provinciale Condorcet du Hainaut

(Ath, Belgium) :

Dr. Matthias Gosselin

Matthias.gosselin@condorcet.be

colasse

Innovator in LED lighting solutions

Rue Puits Marie 79 - 4100 Seraing - Belgique -
www.colasse.be info@colasse.be
Tel : +32 4 225 2589 - Fax : +32 4 365 1376