

New Project

CP 85

Securing skills and expertise in crop light responses for UK protected horticulture, with specific reference to exploitation of LED technology

EMT/HDC/HTA Fellowship

Project Number:	CP 85
Title:	Securing skills and expertise in crop light responses for UK protected horticulture, with specific reference to exploitation of LED technology
Start and end dates:	1 st April 2012 to 31 st March 2017
Fellow:	Dr Martin McPherson
Industry Representative:	Horticultural Fellowship Governance Committee
HDC Lead:	Debbie Wilson
Location:	Stockbridge Technology Centre
HDC Cost:	£132,729 (total cost £224,940)

Fellowship Background:

The fellowships are funded by the East Malling Trust (EMT), the Horticultural Development Company (HDC), and the Horticultural Trades Association (HTA). The funds provide essential underpinning funding to UK-based applied horticultural researchers working in fields of study crucial to the future efficiency and competitiveness of horticultural crops grown in Britain. Each fellowship focuses on training the next generation of applied researcher whilst delivering outputs to industry through a flexible programme of work. The work is flexible so that it can respond to the skills of the individuals undergoing training and the needs of the industry. Each fellowship is managed by a Steering Group, on behalf of the Horticultural Fellowship Governance Committee.

Project Summary:

Funding is essential for the “maintenance or development of knowledge/skills essential to the horticultural industry”; and by securing this knowledge and skills, the Fellowship will contribute to the future efficiency and competitiveness of UK horticulture.

The broad knowledge/skill set that is addressed is that of crop responses to light and their application/exploitation in UK horticulture. This is an important topic that includes two broad areas, lighting itself and the use of “smart plastics” as cladding materials, which are united by a common basis in applying in Horticulture the scientific understanding of how plants respond to light.

Of these two, applied lighting expertise, in particular, has suffered from the loss of expert applied crop physiologists with a strong interest in light, for example Dr Steve Adams, previously of Warwick HRI. So far as we are aware, there are no young applied scientists working in the UK with the current training to replace individuals like Dr Adams, or indeed to

succeed others with interests in this field who are already approaching retirement, including several of the mentors in this project.

This core focus of the fellowship is lighting, and particularly the new commercial possibilities that come from Light Emitting Diodes (LEDs). LED technology has now matured sufficiently to challenge traditional lamps for supplementary and photoperiodic lighting, and to offer new possibilities for targeted spectral lighting or entirely novel designs of lighting systems. Thus, the lack of appropriate expertise in the UK comes at a key time in the development of horticultural lighting.

The enormous potential of LEDs is widely recognised, and knowledge of LED lighting will be crucial to the future efficiency and competitiveness of protected crops in the UK, including those crops in propagation. However, for the UK industry to make full use of the technology it must be it must be securely founded on:-

- (i) a base of well-trained plant scientist(s), fundamental and applied, who can “bridge the gap” between the science of LEDs and the practical and commercial needs of growers
- (ii) adequate R&D facilities to optimise LED use for UK crops under UK conditions.

This Fellowship seeks to address both of these needs.

Aims & Objectives:

- (i) The fellowship will address the first gap, by training the key individual required to exploit the LED facility in the medium-long term, by establishing her/himself as a successful applied lighting biologist, able to attract funding from HDC and other sources, and so support the UK industry in the effective adoption of new lighting technologies.
- (ii) The second gap, the lack of a facility, will be addressed in two ways.
 - a. Firstly, within the first six months of the Fellowship, a small-scale pilot LED facility will be developed at LEC, based on the Fellow’s own initial research and wider consultation.
 - b. Secondly, the Fellowship will have access to a new facility at STC dedicated to the development and demonstration of LEDs for UK horticulture. The initial capital costs associated with the new LED facility will be funded by STC-RF independent of the Fellowship, and with support from Philips, currently the major manufacturer of LED systems for horticulture. The new facility at STC is analogous to the Crop Improvement Centre established at Bleiswijk in the Netherlands, acting as the interface between technological developments in LEDs, scientific advances in understanding plant/crop lighting responses and the commercial drivers of growers. It is anticipated that in addition to the development of unique ‘light recipes’ for specific crops there will be opportunities for both public and private R&D with LED’s e.g. plant habit, taste, oil & nutrient content, improved rooting and pest & disease control, to help justify investment in this new industry facility. It is also expected that work will be

required to look at the economics of multi-tier warehouse production relative to conventional production and this could be accommodated in the design if there was sufficient industry support from the outset. The Fellowship provides a key opportunity to establish the human resource to “grow with the infrastructure”, with STC ensuring a progressive transfer of the costs of the Fellow to other public & private projects during years 3-5 of the Fellowship. However, the Fellow will not necessarily be restricted to evaluation of Philips LED lights but could potentially test lamps from different manufacturers, subject to availability and depending on the results obtained during the initial phases of the Fellowship.

- c. Above all, this proposal also recognises that the Fellow should “grow” to become a leader in LED, other horticultural lighting and related R&D. We believe that there is a window of opportunity for the UK to lead in this field, providing the UK horticulture industry with innovative approaches that will contribute to its long term success in the medium-long term. Without this leadership, the UK industry risks becoming no more than a follower of progress made by its major European competitors, notably Holland. To deliver this future leadership, the Fellowship must include a strong training element that balances a fundamental focus on the needs of the industry with a solid foundation in the underpinning science. The training includes the wider skills and experience needed to establish the Fellow as a recognised figure in horticultural lighting R&D as it is applied to UK protected horticulture. With this in mind we anticipate that, after the initial training period at LEC, the person appointed will spend the majority of their time at the Applied R&D Centres, especially STC, to develop applied R&D skills through mentoring by experienced agronomic and scientific personnel. However, within the Fellowship scheme, we know that the Fellow will be supported by an Advisory Group, and following discussion, we propose the following list of experts representing the broad range of sectors to which the Fellowship is pertinent (Table 1). As well as their vital advisory role, we hope that they will also assist the Fellow in obtaining wider experience, through short periods spent with them, to ensure the Fellow has a broad grasp of both industry need, across a range of sectors, and what science and technology can realistically deliver in a medium-term time-frame.

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