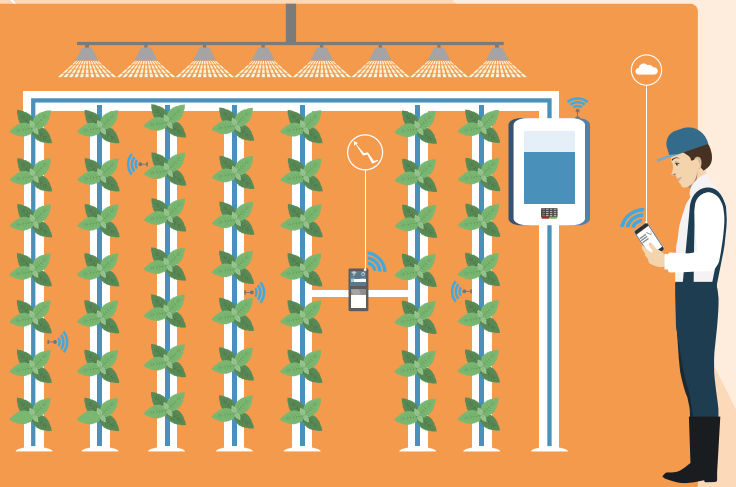


FRESH PRODUCE FOOD SAFETY IN VERTICAL FARMING



Vertical and controlled environment farming is an increasing part of UK, European, and Global food production. However, this emerging and growing industry is currently not effectively represented in terms of certification standards.

Current growing and manufacturing standards – legislative and voluntary – may not identify specific controls relating to this sector.



Vertical and controlled environment farming is a high-tech industry versus conventional field scale production, but as in all food systems, there are potential food safety risks that need to be managed. At present, as the industry is emerging and the growing processes it uses are relatively new. As such the current food safety legislation or voluntary standards do not adequately take account of the specific circumstances of this type of growing.

This emerging production system builds on protective cropping principles but optimises light, water and space in a more intensive way to produce products that rarely, if ever, require synthetic pesticides, such as herbicides, fungicides, and insecticides.

Light levels are managed for optimum growth and even flavour profiling. Soil and growing media may be replaced with hydro or aeroponic systems which use water or mist/air as a nutrient transfer medium.

These innovative systems reduce the potential risk for pathogens being introduced from external points of contamination.

The principle of such a production system is based on the inherent 'safety' of a food produced in a controlled environment, where the plant is only in contact with known and managed inputs. The harvesting process, whether done manually or through automation, is controlled to minimise the risk of cross-contamination through the implementation of hygienic controls for both staff and equipment. Water undergoes thorough treatment, filtration, and monitoring to mitigate the risk of waterborne pathogens, considering it as the primary input in these systems.

Although this system is carefully controlled and managed, the possibility of compromising food safety is still present. It is important to validate water filtration and treatment effectively, as seeds may serve as a potential source of contamination.

Additionally, staff members are capable of spreading viral and bacterial pathogens, there is a risk of pest ingress, and inadequate cleaning practices may promote the accumulation of biofilms and pathogens.

This Enigma III project will seek to understand and develop standardised food safety approaches that can be used by vertical and controlled environment producers, and the wider industry, to provide a consistent approach to food safety control.

THIS WILL PROVIDE:

- Scientifically validated approaches to control measures
- Support due diligence in the event of a food safety outbreak
- Support regulators, auditing bodies and customers during food safety inspections



MAPPING FOOD SAFETY, INVESTIGATING GLOBAL APPROACHES AND DEVELOPING NEW APPROACHES

Food safety is managed by the Food Standards Agency (FSA), with fruit and vegetable production (mainly leafy greens and berries) steadily rising the list of incident notifications.

There are also incidents of food safety challenges in fresh produce globally, and part of this Enigma III project will consider recent food safety outbreaks globally, including the origins of these, how they were managed and the guidance, standards, or legislation in place. Fera researchers along with an engaged group of vertical and controlled environment farming partners, the Fresh Produce Consortium (FPC) and initially

supported by the Food Safety Research Network, will consider whether guidance (a recommendation in the absence of a defined standard or legislation), standard (a mandatory activity verified and certified by a third party) or legislation (a clear set of laws) is required.

A desk-based study will be conducted to consider what is in place on these issues globally, and through a series of industry discussions and workshops this will be further developed into an approach for the UK vertical and controlled environment farming industry.



SCIENTIFIC VALIDATION

Following the desk-based review and industry collaboration, vertical and controlled environment farm businesses will have the opportunity to scientifically validate these agreed food safety approaches in their business.

OUTPUTS

- A DESK-BASED REVIEW OF THE GUIDANCE, STANDARDS AND LEGISLATION IN PLACE GLOBALLY COVERING VERTICALLY AND CONTROLLED ENVIRONMENT FARMING, AND HOW THIS COULD BE USED TO DEVELOP AN APPROACH IN THE UK
- WORKING WITH PROJECT PARTNERS OF THE FRESH PRODUCE CONSORTIUM (FPC) AND VERTICAL AND CONTROLLED ENVIRONMENT FARMING COMPANIES IN DEVELOPING GROWER-LED AND INDUSTRY LEADING APPROACHES TO FOOD SAFETY GUIDANCE AND STANDARDS
- SCIENTIFICALLY VALIDATED APPROACHES FOR INDIVIDUAL VERTICAL FARMING COMPANIES TO FURTHER EMBED FOOD SAFETY IN THEIR BUSINESSES



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