

Adaptation of vertical farming systems to the cultivation of edible alliums

Aim of the research project

The research project aims to implement growing protocols for the cultivation of sweet and pearl onions in vertical farm systems; in addition, the sustainability and resource-efficiency of the processes will be assessed. This research project is implemented within the framework of an agreement between the Department of Agricultural and Food Sciences (DISTAL) of Bologna University and the company Horticolas that operates in the sectors of production and selling onions, potatoes and other agricultural products.

Planned activities

The current research project requires an initial phase in which the candidate will review the existing literature regarding the cultivation of onions in soilless systems and the morpho-physiological effects that different conditions (e.g. temperature, relative humidity, light, nutrition) have on onion development. Next, the candidate will be asked to plan the experimental trials and organise their management.

Afterwards, trials aimed at developing protocols for the cultivation of sweet and pearl onions in a vertical farming system, will be started; by testing up to six different genotypes, the trials will evaluate:

- Light management, enabling to identify optimised spectral composition, light intensity and photoperiod.
- Fertigation management, enabling to identify the appropriate nutrient management during plant development stages.
- Cultivation technologies, enabling to identify the most efficient cultivation systems (e.g., ebb-and-flow, aeroponics, deep water culture) for growing onion.

During the trials, morphological parameters (e.g. growth indexes and biomass analysis) and physiological parameters (e.g. gas exchange, analysis with optical instruments) will be monitored in response to the different experimental conditions; in addition, resource use efficiency data will be collected to assess the sustainability of the cultivation process. Optimised cultivation protocols will be developed based on these parameters.

The candidate will be required to draft reports during the experimental trials and at the end of each one. Additionally, the candidate will be asked to prepare two main reports, one at the mid-term of the period and another at the end.

The candidate is required to have agronomic and experimental skills. A good attitude to teamwork, self-organisation and problem-solving skills are required.

Fluency in the English language is a prerequisite for the candidate.

Location of activities

The candidate's assigned locations will be the offices of the Department of Agricultural and Food Sciences (DISTAL) and the laboratories located there (e.g., greenhouses, climate chambers, vertical farm, analysis laboratories), as well as the experimental facilities at the Cadriano (Granarolo dell'Emilia, Bologna) experimental centre.