

BCSP 2026 PhD Studentships

Plant Cell Foundry for Sustainable Protein Ingredients

BCSP 2026 PhD Studentship · Dr Karen Sarkisyan

PhD Program Overview

The Bezos Centre for Sustainable Protein at Imperial College London, in collaboration with Syntato, is offering a fully funded PhD opportunity focused on building a plant cell foundry for sustainable protein ingredients. Plant hosts have an unusually direct route to scale, since scale-up can mean growing more plants and processing them through existing agricultural infrastructure rather than building large production facilities, but plant host optimisation is not yet a routine part of industry's typical R&D pipeline.

This PhD will build a crop-cell foundry for the Bezos Centre: a small collection of food-relevant suspension cell lines, paired with a rapid plant-cell testing system, to ask a practical question: when a new ingredient design arrives, which plant host should we try first, and what DNA design makes it work? The student will establish cell lines from potato and selected major crops and use them to systematically compare crops as production hosts and genetic designs for protein production, using representative food ingredients including sweet proteins, a growth factor for cultivated-meat media, and a small-molecule biosynthesis pathway. The output will be a unique reusable platform and screening service open to Centre labs and startups to prototype plant-made ingredients early, cheaply and with realistic bioprocess constraints.

Bezos Centre for Sustainable Protein Doctoral Program

This PhD program is part of the **Bezos Centre for Sustainable Protein's** broader initiative to advance knowledge and accelerate innovation in sustainable proteins, to make the food system more sustainable, equitable, resilient, efficient and healthy. The centre will do this through five pillars of work, namely research, translation, education, network and advocacy.

Research Focus

This interdisciplinary PhD will combine perspectives from plant synthetic biology, bioprocess engineering, lab automation and AI-driven design to explore key themes such as:

- **Establishment of food-relevant crop cell lines:** establishing or obtaining potato plus at least 2-3 additional crop cell lines and benchmarking growth, transformation and reporter expression as robust, stable suspensions.
- **Comparative DNA design across plant hosts:** testing representative ingredient classes, including a sweet protein, a protein growth factor for cultivated meat media, and a terpene or another natural product, with different plant regulatory elements, secretion tags and compartment targeting to optimise yield.

- **Predictive scale-down bioprocessing:** moving the best cases into controlled bioreactors, stable plant lines and simple downstream processing, and testing whether plant-cell-culture assays and small bioreactors can form a predictive scale-down system for plant-made food ingredients.
- **Centre-facing screening platform:** developing a reusable platform and open screening service for Centre labs and startups, leaving behind host-performance data, protocols and design rules that strengthen future proposals and Imperial collaborations.
- **AI Scientist:** using and further developing Syntato's AI co-scientist capabilities and AI-co-scientist-driven experimentation.

Supervisory Team

- **Principal Investigator:** Karen Sarkisyan, Group head at Imperial College London and MRC LMS (<https://designing.bio>); Founder and Director of R&D at Syntato (<https://syntato.garden>)
- **Industry supervisor:** Lea Meneu, Lead Scientist, Syntato

Program Details

- **Funding:** Fully funded for UK home students
- **Location:** The research will be based at the Bezos Centre for Sustainable Protein at Imperial College London, with embedded experimental work on Syntato's plant-cell screening platform (cell-culture and bioreactor access, DNA design workflows, assay automation and supervision)

How This PhD Will Contribute

This project sits at the intersection of plant synthetic biology, food bioprocessing and platform engineering. If successful, the Centre will gain a reusable foundry for early plant-made ingredient decisions, so a lab with a promising protein ingredient or biosynthetic pathway will no longer need to first build a full plant-molecular-farming programme. The work will inform one of the most critical R&D decisions in alternative-protein development, namely which host organism to use, currently a decision that is rarely evidence-based. Non-confidential protocols, host-comparison data and design rules will be published to enable Centre researchers to run better plant-host experiments and to design new PhD and postdoc projects. This work will directly support the Bezos Centre's mission to build a sustainable, equitable, resilient, and healthy food system.

Your Profile

We are looking for a PhD candidate with:

- An engineering mindset
- A background in plant biology, molecular biology or a related quantitative discipline

- Useful but not essential: prior experience with plant tissue culture, cloning, recombinant protein expression, fermentation, or automation Most importantly: love for careful wet lab experimental work and motivation to contribute to the field
- Comfort working between an Imperial Centre and an engineering-focused startup