

An Indian-Australian research partnership

Project Title:

High Quality Protein Extraction From Plant Based Sources

Project Number

IMURA0666(6)

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Centre for Technology Alternatives for Rural Areas

Research Academy Themes:

Highlight which of the Academy's Theme(s) this project will address?

(Feel free to nominate more than one. For more information, see www.iitbmonash.org)

1. Advanced computational engineering, simulation and manufacture
2. Infrastructure Engineering
3. **Clean Energy**
4. Water
5. Nanotechnology
6. **Biotechnology and Stem Cell Research**

The research problem

The Food and Agriculture Organization of the United Nations estimates that 843 million people worldwide are hungry and a greater number suffer from nutrient deficiencies. Approximately one billion people have inadequate protein intake. Growing global demand for food and feed protein drives the search for new and sustainable protein sources. The environmental burden of meat and dairy production, along with health problems linked to excess meat consumption, have increased consumers' interest towards plant-based alternatives to animal-based foods. Also, the use plant proteins as an alternative to animal proteins has increased due to its nutritive value, bioactivity and functional properties.

Biorefinery's of the future will be able to recover different protein resources and can contribute to obtain products directed to specific needs for food, ruminant and non-ruminant feed, and renewable feedstocks for the chemical industry. There is a huge potential to extract proteins from plant based sources. With this scheme, biorefinery technologies and the use of protein in more efficient way may avoid the protein shortage in time to come. In addition, the improved use of crops as protein and or amino acids resources leads to an increase in crop value. The project will examine classical and novel extraction pathways for the isolation of food proteins and peptides from a range of substrates. For eg. Oilseeds cakes, microalgae, fruits and vegetable processing waste could be utilized for protein recovery.

Project aims

1. Mapping of potential plant based substrates (native to India and Australia) for protein extraction
2. Detailed composition analysis of proteins and segregation based on potential applications
3. Development of pathways to extract high quality proteins and protein hydrolyzates.
4. Ascertaining functionality of extracts for industrial application
5. Identify and where possible, develop new applications for proteins and amino acids recovered from food by-product sources eg components of bio-based surfactants, feedstocks for green solvents
5. Assessment of techno-economic feasibility of the developed processes

Expected outcomes

The project will deliver following outcomes:

1. Protocols for optimal recovery of high value protein/protein isolates and amino acids from biomass feedstock
2. Through proper information dissemination, it is expected that the project outputs will increase interest and investment from potential stake holders (Farmers, consumers, food and chemical industries).
3. New commercial opportunities to valorise food by-products

How will the project address the Goals of the above Themes?

The proposed project is 'right on spot' in the domain of 'Clean Energy' and 'Biotechnology research' themes.

Capabilities and Degrees Required

Candidate should have at least one degree in Chemical engineering/Chemistry/Food Engineering/Biotechnology with Maths background/Biochemical Engineering/Bioprocess Engineering. This project requires strong understanding of organic chemistry, particularly protein chemistry, biochemistry (enzyme applications) and biochemical engineering principles. Hands on experience with analytical instruments such as HPLC, Gas Chromatography, Mass Spectrometry UV Spectroscopy, FTIR and Protein Sequencers is desirable.

Potential Collaborators

Professor Andrea Robinson and Emeritus Professor Roy Jackson (Monash University)

Please provide a few key words relating to this project to make it easier for the students to apply.

Biorefinery, Proteins, Food, Peptides, Amino Acids