

An Indian-Australian research partnership

Project Title:	Integrated Biorefinery Concept from Pomegranate Processing Waste	
Project Number	IMURA0509	
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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
7. Humanities and Social Sciences

The research problem

India is the one of the largest producers of fruits & vegetables in the world with an annual production of around 250 million tonnes. Quantam of waste coming from agro processing industries is quite significant.

The by-products from these industries generally have high moisture content and are thus prone to microbial spoilage. The high moisture content of the wastes also leads to increased drying and storage costs. Thus, waste is typically used as a feed in order to minimize the economic impact of its treatment and stabilization and very few large scale industries generate biogas from organic waste. India is the largest producer of pomegranate in the world. Production and productivity of this fruit has increased quite significantly in last few years. Pomegranate processing waste in rich in reducing sugars, pectin, very healthy oil and polyphenols. Pomegranate peel extract has anti-inflammatory, antioxidative, anti-microbial, anti-infective,

antimutagenic and hepatoprotective properties. Good amount of free sugars and protein can further add value. This presents a unique opportunity for the production of biofuels, biobased chemicals and recovery of valuable components materials from pomegranate peels and seeds wasted every year.

Project aims

1. To develop an integrated process to recover value added components from pomegranate seeds and peels
2. To develop process models for the conversion of pomegranate processing waste into biofuels/biochemicals and value added products
3. Scale up of the process
4. Development of nutraceutical food products from extracted components.
5. Assess the techno-economic feasibility of the developed processes

Expected outcomes

The low-economic value pomegranate processing waste is one of the major wastes generated by the fruit processing industry in Maharashtra and has been suggested as a sustainable source for biorefinery applications. Peel extracts and seed oil find numerous applications in cosmetic, pharmacy and food industry. This work will lead to original contributions from application perspective, that provide better understanding of the biorefinery system. Following pilot scale process validation, this technology could immediately be retrofitted into fruits processing plants, creating more jobs and enhancing rural economic development.

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 Food Engineering, Biochemical Engineering, Chemical engineering/ Pharmaceutical Sciences (M.Pharma With Thesis)/Biotechnology. This project requires strong understanding of Chemistry and biochemical engineering principles. Hands on experience with analytical instruments such as HPLC, Gas Chromatography, DSC and FTIR is desirable.

Potential Collaborators

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

Food Processing, Nutraceuticals, Functional food, Product development