

Date:15/10/2021

To,

Dr. Shankar M Khade, Dr. Muthu Aathi, Mr. Ranjeet Kumar  
Assistant Professor

School of Engineering,

Ajeenkya D Y Patil University

D Y Patil Knowledge City

Charholi Budruk, Via Lohegaon

Pune 412 105, Maharashtra, India

Dear Sir,

**Subject:** Acceptance of Proposal for Recycling of filamentous fungal biomass waste for anaerobic digestion and biogas generation

I am pleased to inform you that your project proposal on **Recycling of filamentous fungal biomass waste for anaerobic digestion and biogas generation**, has been accepted which would be effective for a period of two years. The project has been granted **INR 35 Lakhs** to accomplish the following objectives:

- a) Biogas is one of the most cost-effective and ecologically beneficial forms of renewable energy. It could be a viable option for the world's insatiable energy demand while also reducing waste and greenhouse gas (GHG) emissions. Anaerobic digestion may transform sewage sludge, agricultural and crop leftovers, animal dung and industrial organic wastes, and wastewaters into biogas. The type of the raw materials used for digestion, as well as the pH of the medium, influence the composition of biogas. Under anaerobic conditions, bacteria decompose complex organic matter into simpler components, resulting in biogas and fertilizer. The technique of using anaerobic respiration for the production of biogas has numerous environmental benefits. It helps to treat organic wastes along with introducing green energy, protecting the environment, and also helps to reduce greenhouse gas emissions. There are four phases to the biodegradation of complex organic compounds. Hydrolysis, acidogenesis, acetogenesis, and methanogenesis, are the respective steps. The composition of biogas has a higher concentration of methane which generally makes up to 50% to 75%. This methane content makes the biogas flammable and also generates a blue flame which can be used as an energy source. The calorific value is fixed on the basis of the concentration of CH<sub>4</sub> as the other substances do not play a major role in the energy content. The calorific value of raw biogas is 21MJ/m<sup>3</sup> considering that the density of 1.22 kg/Nm<sup>3</sup> CH<sub>4</sub> present in the raw biogas is up to 50% which is also similar to that of air (1.29 kg/Nm<sup>3</sup>). So as to know more about the various applications of biogas, it is a must that the concentration of CH<sub>4</sub> is appreciably higher (i.e. >90%).



This also states that the utilization capacity of any biogas is determined by the composition of the gas.

- b) Upgrading biogas is a widely used, well-developed, and easily obtainable technique. It is becoming more widely used around the world, although it is still in its infancy when compared to the biogas producing industry. After treatment, biogas can be used for a variety of purposes, including electricity and heat generation, natural gas grid connection, and automotive biofuel.
- c) The current project proposal is intended to focus on the re-utilization of filamentous fungal biomass for biogas generation under anaerobic conditions. The microbial biomass produced in many cases is being considered as a waste product upon various fermentations, and can be re-utilized as a raw material to generate the biogas upon anaerobic digestion by methanogenic bacteria. This would assist in waste management in a sustainable approach.

**1. Objectives:**

- a) Sustainable approach to manage fermented filamentous fungal biomass waste.
- b) Screening of various filamentous fungal biomass to re-utilize as substrate for biogas generation.
- c) Elemental composition of the screened dried fungal biomass.
- d) Optimization of physico-chemical parameters as metabolic efflux and the ratio of substrate to the methanogenic bacteria inoculum under specified conditions.
- e) Scale up of biogas generation and transfer of technology at pilot scale.

We are excited about the opportunity to collaborate with you and are confident that this partnership will be mutually beneficial. We look forward to working closely with your team to ensure the success of this project and achieve the desired outcomes.

Please feel free to reach out to us regarding any clarifications or further details required. Once again, thank you for your proposal. We look forward to a successful and productive partnership over the next two years.

Sincerely,

A handwritten signature in blue ink, appearing to read 'J. Singh'.

Director