Seed Grant Application Cover Page

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Amount Requested:	\$12,000			
Proposal Title: Biological pretreatment of agricultural wastes with biochar amendment prior to solid-state anaerobic digestion				
This is an internal proposal that DOES NOT need to be routed through OSP				
SIGNATURES OF APPROVAL:				
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Principal Investi	igator James	Department Head	7	Dean/Director
Principal Investi	igator	Department Head		Dean/Director
Principal Investi	igator	Department Head		Dean/Director
PROPOSAL CHECKLIST: x				Early faculty establishing scholarly program (5 years or less employment at UI) Established faculty transitioning into a new scholarly area
If yes, have report(s) of previous seed grant(s) been submitted?				
If so: Organiza:	tion Date Sub	mitted:	unded:	: Tyes TNo

TITLE: Biological pretreatment of agricultural wastes with biochar amendment prior to solid-state anaerobic digestion

Abstract

During investigations using biochar (charcoal for soil application) as an amendment during composting of a mixture of dairy manure, food waste, paper and wood pellets, we developed conditions that stably (from 100 to more than 500 hours) and reproducibly maintained microbial consortia dominated by diverse genera and species of Clostridia. We consider the early stage of this process as a biological pretreatment. We hypothesize that biological pretreatment that subjects the feedstock to moderately high temperature and stable establishment of cellulolytic bacteria such as *Clostridia* will lead to enhanced methane yield upon transfer of the material to an anaerobic digester. We further propose that feedstock supplemented with biochar is more amenable to solid-state or dry anaerobic digestion, a process that saves on operating energy and water. We will determine methane yields from feedstock that has undergone biological pretreatment and compare this to untreated feedstock under solid-state and completely mixed submerged conditions. We will investigate the role of biochar in promoting anaerobic digestion under solid-state conditions through microbe-surface area interactions and increased water retention. We will use various molecular and microscopic methods to identify and quantify the major bacterial populations involved in cellulolytic and saccharolytic activities during pretreatment and anaerobic digestion.