

CLIMATE CHANGE INNOVATION AND TECHNOLOGY FRAMEWORK

Awardee Summary

CCITF PROGRAM	Clean Technology Development
PROJECT TITLE	Process development for the cannabis waste management: on the way to sustainable waste disposal and bioenergy production
SECTOR	Waste to Value-Added, Energy Efficiency
ORGANIZATION	University of Alberta
PROJECT LEAD	Yang Liu
AI PROJECT ADVISOR	Christine Murray
GRANT AMOUNT	\$99,500
START DATE	2018-10-15
END DATE	2019-11-15

PROJECT OBJECTIVE: Feasibility study on the development and optimization of cannabis waste pretreatment options and anaerobic treatment conditions for effective cannabis waste treatment and energy recovery.

PROJECT PROFILE: The legalization of cannabis cultivation in Canada in the summer of 2018 is anticipated to foster a boom in the cannabis industry, leading to significantly increasing the burden of cannabis waste disposal to municipalities. Washington for example has accumulated 1.7 million pounds of cannabis waste since the cannabis legalization in 2014 in the US and has become a real challenge for both producers and regional landfills [1]. A huge market need for cannabis waste disposal exists. However, few efforts have been made in the past for cannabis waste disposal, expecting several widely acknowledged conventional methods, such as composting, landfilling, and incineration. Several challenges have been identified for the current cannabis waste disposal methods. Compositing and landfill are often unwanted due to the time and space consideration, while incineration is energy intensive. The GHG generated from these processes often fails to be collected and reused and is released into the atmosphere. Further, transportation of the cannabis waste to the disposal facilities must follow the municipal by-laws in that the waste leaving the cultivation facilities and entering the disposal facilities must be tracked down to grams; and the bill of waste disposal issued to the cannabis producers further decreases industry revenue. As such there is an urgent technical need to develop innovative and cost-effective strategies for the disposal of cannabis waste. As very limited information is available on this topic, this project will be a feasibility study focusing on the development and optimization of cannabis waste pretreatment options and anaerobic treatment conditions for effective cannabis waste treatment and energy recovery. Cannabis waste is rich in lignocellulosic biomass, which can serve as a source of energy (in the form of methane) in the anaerobic digestion (AD) process. Compared to aerobic waste treatment processes, AD saves operational cost, and generates energy in the form of methane, which with appropriately designed gas collection systems, can be recycled and reuse thus eliminating GHG emissions [2]. In this project, several pretreatment methods aiming

at improving the biomass digestibility will be tested and the efficiencies will be evaluated based on the methane production potential. Pretreated cannabis waste will be anaerobically digested in a laboratory scale AD reactor. The chemical properties of the cannabis waste will be determined after pretreatment as well as after AD. The microbial community structure of the digester sludge and digestate will be determined. These will be achieved after a full characterization of the cannabis waste upon receipt, given that information on the cannabis waste properties is generally lacking. The project will lead to the development of Alberta-made cannabis waste treatment processes fit for different scales of operation. This project will be accomplished in collaboration with Mr. Jim Hole from Hole's Greenhouses & Gardens Ltd. However, we believe that this project will be of great interest to other existing and potential cannabis producers in Alberta, nationally and internationally.

GHG EMISSION REDUCTION SUMMARY: