CONVERSION OF AGRICULTURAL BIO-MASS TO ENERGY VIA CATALYST ASSISTED PYROLYSIS

D.L. Compton and M.A. Jackson

New Crops and Processing Technology Research, National Center for Agricultural Utilization Research, ARS-USDA, Peoria, IL 61604, USA

One method for converting agricultural waste or specifically grown crops to energy is by heating this "bio-mass" to high temperatures in the absence of oxygen, a process called pyrolysis. Burning bio-mass in the presence of oxygen produces mostly carbon dioxide and water. Burning biomass in the absence of oxygen produces carbon char, an oily liquid, and several gasses including hydrogen, natural gas, propane, and carbon dioxide. It is hoped that the oily liquid and the gasses produced from pyrolysis can be used as fuel that can be substituted for the fossil-based fuels currently used. Ideally, small-scale self-sustained pyrolysis units (prototypes have been developed by research groups in Canada and the U.S.) would be able to be used by farmers to produce power using the readily available bio-mass located on-site. The temperature, speed, and time with which the bio-mass is burned effects the char, oily liquid and gasses that are formed. Very high temperatures (> 600 °C) and very fast burning (< 1 min) result in a char, an oily liquid, and gasses with the best properties. Our research focuses on reducing the temperature that the bio-mass is burned at without affecting the desired properties of the three products. We hope to accomplish this by using catalysts added to the pyrolysis. We have developed a small, analytical-scale instrument that allows us to rapidly analyze the char, liquid, and gasses produced during pyrolysis. We are currently investigating the affect of several catalysts to maximize the oily liquid and gasses produced while lessening the amount of char. Additionally, we hope to tune the catalysts so that the oily liquid and gas fractions possess the best fuel properties possible.

Contact: David L. Compton, New Crops and Processing Technology Research, NCAUR-ARS-USDA, 1815 N. University St., Peoria, IL 61604, USA. Tel: 309-681-6321. E-mail: David.Compton@ars.usda.gov.