

PhD Dissertation
Department of Environmental Science and Policy
George Mason University

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Title: *Conversion of Fatty Acids Methyl Esters (FAMEs) into Hydrocarbon Fuels*

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ABSTRACT

Producing fuels from agricultural crops has always been a subject of interest throughout the world. The European colonial powers have tried a variety of crops, including peanuts, as a convenient means to operate machineries as well as vehicles for transportation. The WWII led many countries to think about generating fuels from native crops, but these efforts were short-lived due to the cheaper and available petroleum. The Oil Crisis of 1970 had a profound economic impact and convinced many countries, Brazil in particular, to produce fuels from native crops. Since then, through a variety of laws, the United States has provided incentives as well as financial support for research and production of fuels from agricultural sources. The characteristics of fatty acid methyl ester (FAMEs) from plants has been investigated in relation to their ability to be converted into hydrocarbon fuels. Two samples of FAMEs were studied in this dissertation; one from peanut and the other from soybean. The samples were treated in a manner to duplicate the environmental condition of the distillation column in current refineries. Each type of sample was pyrolyzed at different length of times to determine their behavior during the entire process. In addition, GC/MS was utilized to identify the products formed during the pyrolysis reactions. The results of this study have demonstrated that other compounds possessing similar characteristics as peanuts or soybeans can produced fuels from pyrolysis through free radical reactions.