The Feasibility of Dendroctonus ponderosae Infested Pinus ponderosae as a Source of Biomass in Bio-Oil Production

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As the search for a cleaner source of energy continues, bio-oil has shown to be an attractive alternative to fossil fuels. Bio-oil is a liquid fuel made from biomass, or organic matter derived from living, or recently living organisms. This project examines the feasibility of Pinus ponderosa that has been killed by the Dendroctonus ponderosa as a source of biomass in the production of bio-oil. Trees were identified by pine beetle boreholes and collected. The lignocellulosic biomass then underwent the treatment of liquefaction at 300°C at four and six hours. After liquefaction the samples were then filtered using acetone. Once filtration was complete, the samples then underwent liquid-liquid extraction using ethyl acetate. Finally the samples were rotovapped to remove the ethyl acetate. When the samples were complete it underwent analysis using Gas Chromatography Mass Spectroscopy and Attenuated total reflection Infrared Spectroscopy. The results of this experiment indicate that the lignocellulosic biomass was able to be successfully converted into a feasible bio-oil when heated at 300 °C for six hours. It was not able to successfully be converted into a feasible bio-oil when heated at 300 ° C for four hours. When the sample undergoes liquefaction at 300 °C at six hours the lignin in the biomass is broken down, creating a spike in alcohols, carbonyls, alkanes, alkenes, and aromatics. This deterioration of lignin is essential in the production of bio oil.

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