Sun Grant Western Regional Center
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Customizing biodiesel derived from tropical trees

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Overview

The remote locations and distinctive flora of the Pacific Islands create a unique situation for biofuel production. The project team is investigating the use of coconut, kamani, and Jatropha trees as feedstocks for biodiesel production, which would enhance energy self-sufficiency for these locales. Substitution of biodiesel has significant environmental advantages in reducing engine emissions of particulates, hydrocarbon, sulfur dioxide, and carbon monoxide, although there can be an increase in the emissions of nitrogen oxides (NOx), an important contributor to smog, acid rain, and other atmospheric pollutants. The multi-institutional team seeks to determine the growing conditions for the trees that may result in low NOx emitting biodiesel. The project combines agronomic research and chemical analysis (through the lab of the Alaska co-PI) to develop viable, low polluting biofuels with enhanced fuel properties that can potentially improve air quality and decrease emissions of green house gases and those contributing to acid rain.

Progress to Date

Four institutions in the Pacific region (College of Micronesia, Northern Marianas College, University of Guam, and University of Hawaii) are producing oils from coconut, kamani, and Jatropha. The oil producing institutions have developed a protocol to investigate fatty acid differences attributable to temperature, as affected by topographical elevation and season, as well as soil type and fertilizer inputs. Each institution has identified growing sites, collected soil samples, applied fertilizer, recorded temperature data, collected seed, extracted oil and shipped oils to the University of Alaska, Fairbanks (UAF). The UAF partner is conducting fatty acid analysis, converting the sample oils into biodiesel and analyzing diesel engine emissions from the biodiesel produced from the tropical oils.

The project will establish whether a relationship exists between growing conditions of tropical tree oil crops and NOx emissions of the resultant biodiesel. If these relationships are established, the resultant information would indicate where these trees may be grown and when seed may be harvested to minimize NOx emission.

Collaborators

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