BIOFUEL FEEDSTOCKS

Sustainable Production Strategies for Dependable Feedstock Supply

Overview:

Nearly 95% of the energy consumed in the State of Hawaii comes from imported fossil fuels; therefore, securing alternative energy resources has been a high priority in the energy strategy of the state. Hawaii has ideal conditions for production of fast-growing biomass energy crops. However, limited irrigation water supplies threaten sustainable production of bioenergy feedstocks. Our strategy is to apply the ALMANAC model to develop management strategies that maximize water use efficiency so as to optimize feedstock yields. Good progress has already been made to gather crop parameters that are needed for model simulation of four candidate bioenergy crops: sugarcane, energycane, energy sorghum and banagrass. Besides water use efficiency, proposed management strategies should also minimize impacts on ecosystem services.

Benefits of Lignocellulosic Ethanol:

The proposed candidate bioenergy crops are ideal for the lignocellulosic biofuel industry because of the high biomass yields, can be grown with few inputs, and compete less with land and water resources needed for food crops. In general, lignocellulosic feedstocks enhance ecosystem services when compared to corn, the current biofuel crop of choice.

Collaborative Effort:

USDA ARS

Texas A&M AgriLife Research Blackland

University of Hawai'i Mānoa

Objectives:

- Develop management strategies that maximize water use efficiency.
- Design and test sustainable biomass production systems, to include crop rotations with legumes.
- Determine biomass harvest thresholds and obtain realistic estimates of biomass quantities to be produced by those systems.
- Evaluate spatial and temporal yield variability and associated production risks.
- Assess long-term environmental impacts on organic carbon storage and the greenhouse gas emission balance, runoff and soil erosion, nutrient and sediment losses effects on water/soil quality.

ALMANAC Model:

ALMAMAC (Agricultural Land Management and Numerical Assessment Criteria) model operates on a daily time step and has components to simulate crop growth and competition of plant communities, hydrology, erosion, soil carbon, nutrient cycling, and pesticide fate. The model has been extensively used to analyze plant community dynamics, phenology, water use efficiency, radiation use efficiency, crop grain and bioenergy feedstock yields, and the associated impacts on ecosystem services. It can also be adapted to evaluate impacts of climate change and global warming.

Dr. Jim Kiniry
USDA Agricultural Research Service
Grassland, Soil, and Water Research laboratory
808 East Blackland Road, Temple, TX 76502 • 254.770.6506

Dr. Norman Meki
Texas A&M AgriLife Research
Blackland Research & Extension Center
720 East Blackland Road, Temple, TX 76502 • 254.774.6103