

# BIOFUEL FEEDSTOCKS



## Background

Biofuels are a renewable energy source that can reduce our dependence on fossil fuels, mitigate greenhouse gas emissions, and create new markets/uses for existing and new crops. However, despite our many excellent options for biofuel feedstocks available in the U.S., critical limiting factors such as available water resources must be addressed first to create sustainable bioenergy production. Our strategy is to apply the ALMANAC and APEX computer models to develop management strategies that maximize water use efficiency so as to optimize feedstock yields. Research into crop parameters required for modeling of popular bioenergy crops (sugarcane, energycane, energy sorghum, banagrass, switchgrass, miscane, and Miscanthus) are already underway.

### ALMANAC and APEX Models:

ALMANAC (Agricultural Land Management and Numerical Assessment Criteria) and APEX (Agricultural Policy Environmental eXtender) operate on a daily time step and have components to simulate crop growth, management strategies, competition of plant communities, hydrology, erosion, soil carbon, nutrient cycling, and pesticide fate.



### 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.

### The outcomes of this research will:

- Allow growers and policy makers to assess site-specific environmental and economic costs of different biofuel feedstocks and make informed decisions that maximize energy production while minimizing water use (biomass/fuel yields per unit of water input) and impairment.
- Show regions most suitable for feedstock production and the likely water quality impact.
- Provide the framework for modeling new feedstocks and production practices as they become available.

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