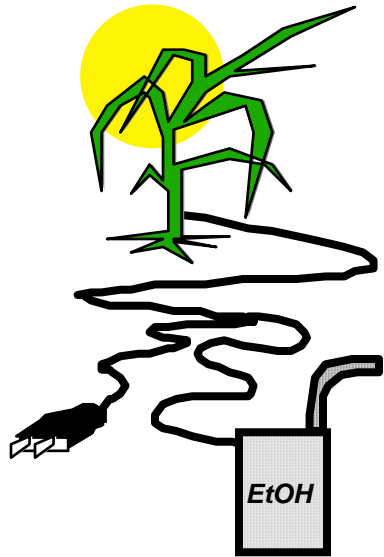


# Ethanol Production Option



**Charles Kinoshita**

**College of Tropical Agriculture &  
Human Resources**

**University of Hawaii at Manoa**

**Presentation at:**

***Hawaii Agriculture Bioenergy Workshop***

***Panel on Hawaii Crop Production***

***Opportunities***

**October 27, 2006**

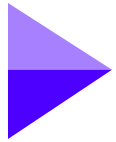


# **Structure of Panel Presentations on Hawaii Crop Production Opportunities**

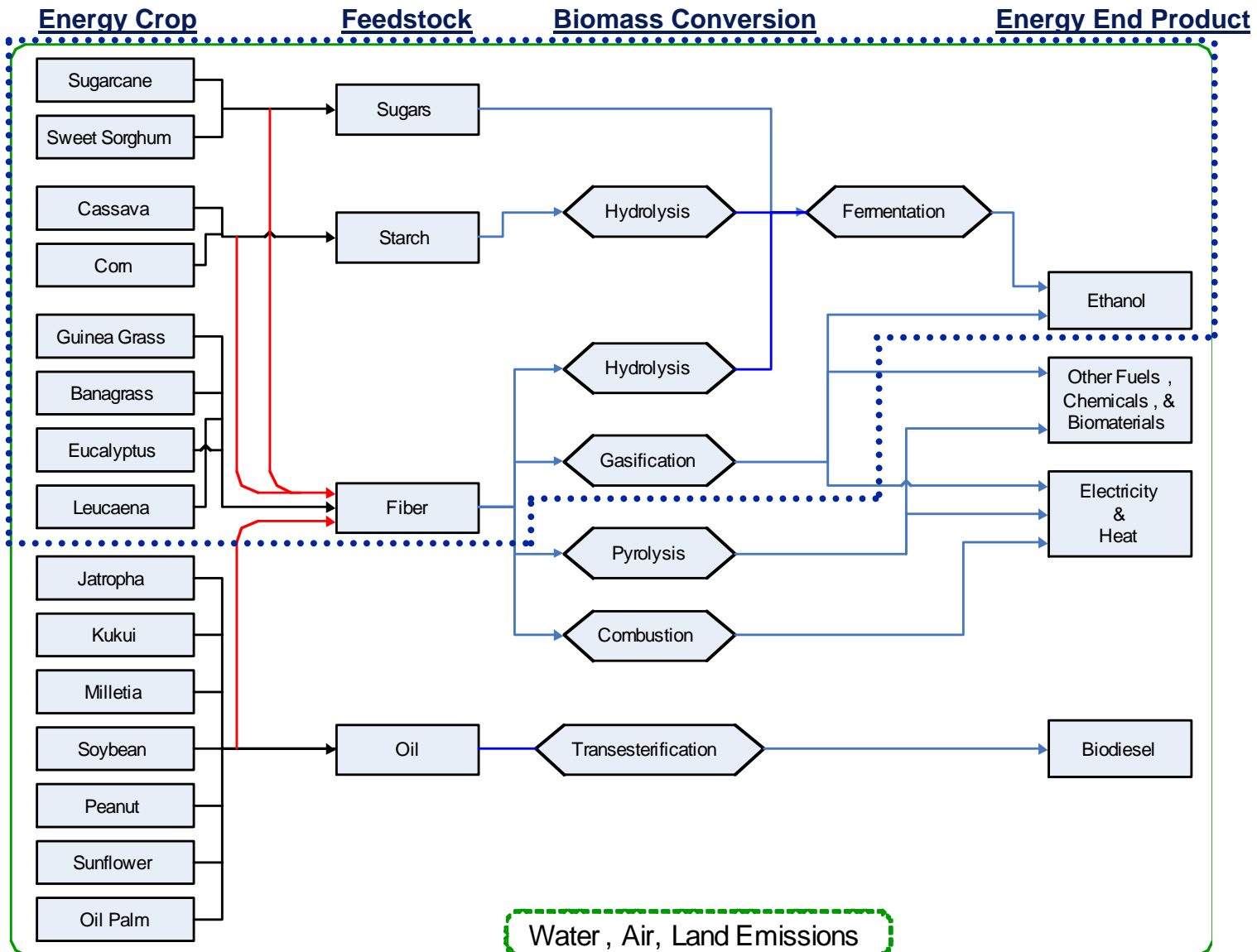
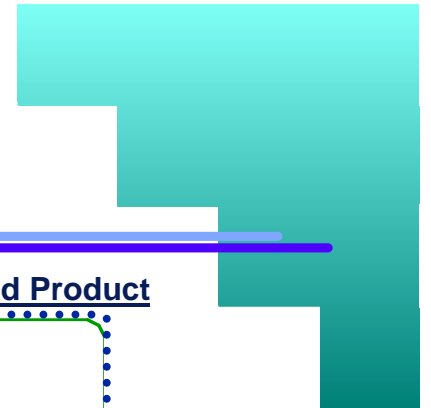
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**For each of the scenarios, biomass-to-  
ethanol, biodiesel, electric power, discuss:**

- **Existing resources and energy-crop options.**
- **Feedstock production.**
- **Biomass conversion.**
- **Byproducts.**
- **Barriers and potential solutions.**



# Bioenergy Options



**EtOH  
Platform**

# Potential Yields from Selected Energy Crops

100,000 acres of moderately productive land might produce

Feedstock	Feedstock production (million tons/y)	Conversion (gal EtOH/ton feedstock)	EtOH Production (MGPY)
Sugarcane sugar	0.64	143	92
Sugarcane sugar and fiber	1.60	110	176
Energy cane fiber	1.80	88	158
Corn starch	0.48	135	65

Unknown

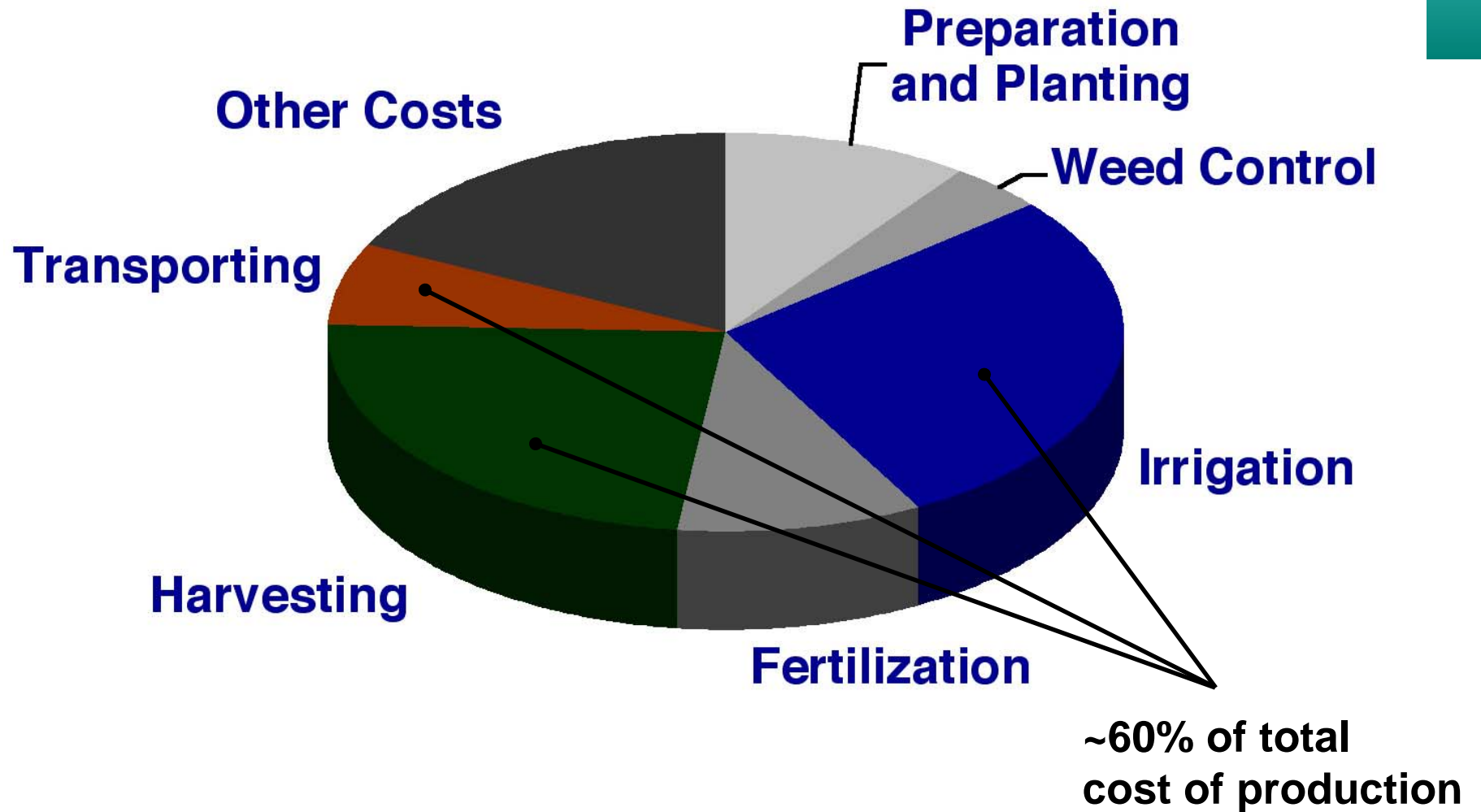
# Preliminary Screening of Energy Crops for Ethanol Production

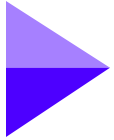
Crop	Commercial Experience	Yield	Agronomic Inputs
Sugarcane	+	+	-
Sweet sorghum	-	0	0
Cassava	-	0	0
Corn	0	0	0
Guineagrass	0	+	-
Banagrass	0	+	-
Eucalyptus	0	0	0
Leucaena	0	0	+

Notes: + = favorable    0 = neutral    - = unfavorable

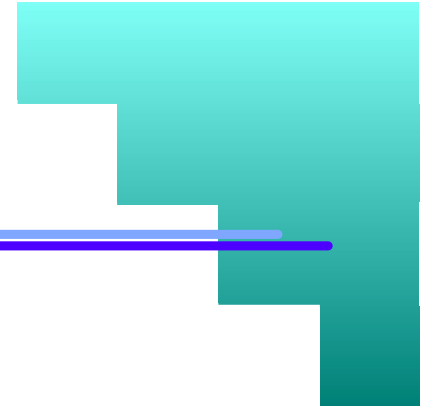
- Technologies and economics for sugarcane are established.
- Corn shows promise; though yield, cost, and byproduct markets need to be ascertained.
- Grasses are high yielding but depend heavily on water/irrigation.
- Tree crops need less inputs than grasses.

# Breakdown of Major Crop Production Cost Centers - Example: Banagrass





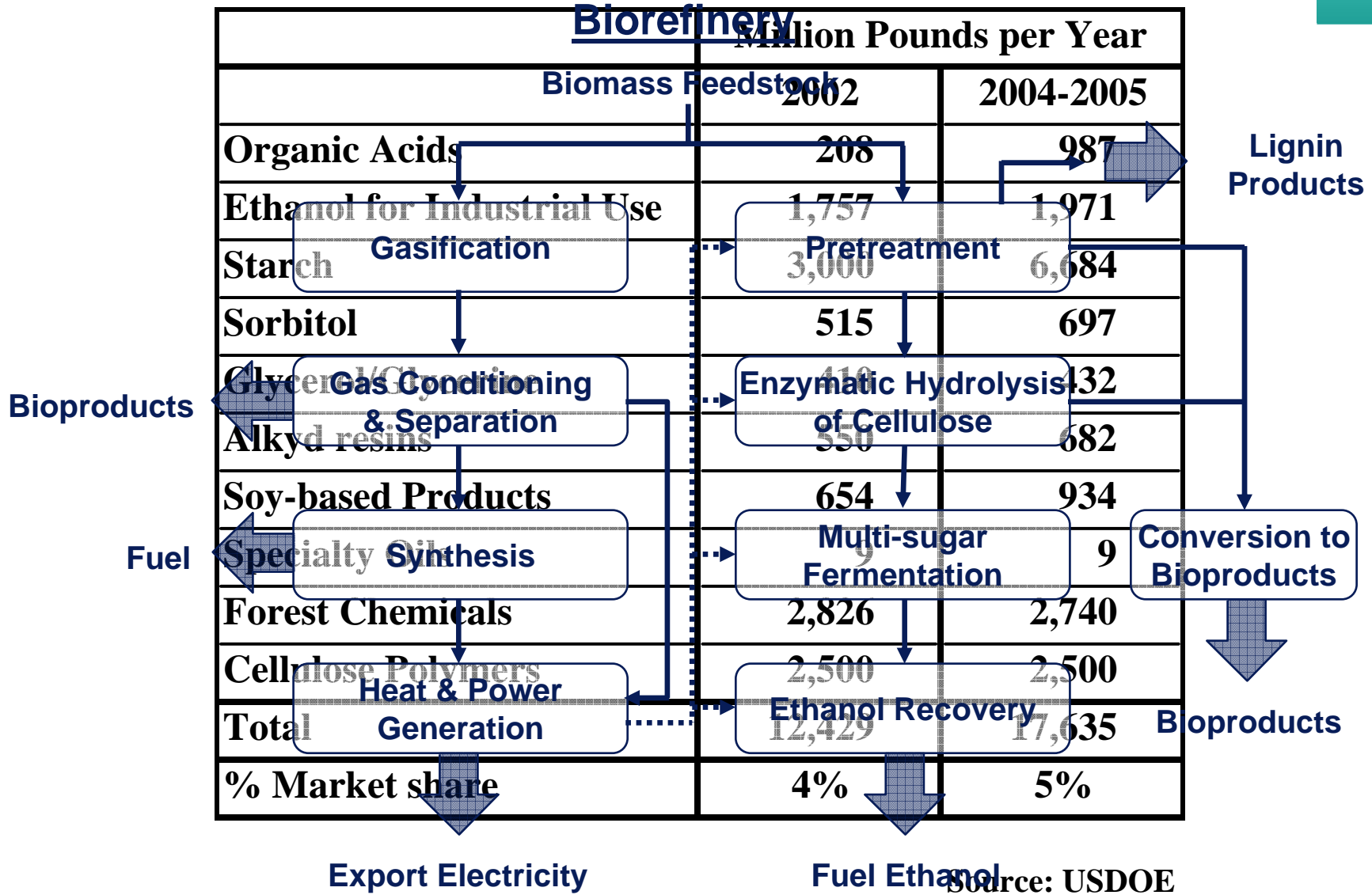
# The Water Challenge



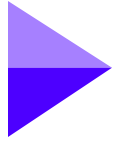
## Example: Sugarcane

	Dry Plantation (80" applied + 20" rainfed; 7.5 tons sugar/acre-year)			Wet Plantation 20" applied + 80" rainfed; 6.5 tons sugar/acre-year)		
Water Rate (\$/1000 gal)	0.10	0.50	1.00	0.10	0.50	1.00
Water Cost (\$/ac-y)	217	1,086	2,172	54	272	543
Water Cost (\$/gal EtOH)	0.20	1.00	2.00	0.06	0.29	0.58
Water Cost (% of value)	8	40	80	2	12	23

# Production of Biobased Products/Byproducts







## **Major Bottlenecks/Unknowns**

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- **Yield, cost, sustainability of production for some crops.**
- **Availability and cost of irrigation water.**
- **Commercialization of emerging conversion technologies.**
- **Optimal suite of byproducts.**
- **Uncertainty of government support and markets.**

