Identifying '2nd-generation' biofuel crops and their capacity for invasiveness in Hawaii

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Outline

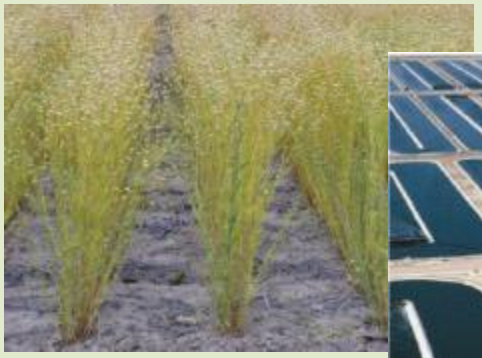
- Agronomic development – biofuel crops
- '2nd generation' biofuel crops
- '2nd generation' invasives?
- Early data on jatropha in managed conditions
- Responsible R&D for sustainable biofuel production

Agronomic *vs.* Invasive Characteristics

- Easily propagated
- Environmentally adaptable
- Heavy seed and/or biomass yield
- Rapid growth
- Low-input (drought tolerant, low fertility requirements)
- Perennial *vs.* Annual

Biofuel Crop Options

- Sugar/Lignocellulosic
  - Corn
  - Sugarcane
  - Switchgrass
  - Sorghum
  - Banagrass
  - Giant Reed
  - Guineagrass
  - *Albizia*
  - *Luecaena*
- Oils
  - African oil palm
  - Coconut
  - Soybean
  - Canola
  - Algae
  - *Jatropha curcas*
  - Kukui
  - *Moringa oleifera*
  - Camelina
  - Castor








‘2nd Generation’ Crops

- ‘2nd generation’ basically implies experimental crops
  - Little commercial development in place internationally
  - Further efforts at domestication needed
  - Lessened inputs w/ greater potential yields often cited
  - Are these crops potentially invasive???

Hawaii's potential '2nd generation' crops

- Fast-growing 'energy grasses'
  - Banagrass, switchgrass, guineagrass
- Fast-growing tree species
  - *Albizia*, *Luecaena*, poplars?
- Perennial oilseed-bearing species
  - Kukui, *Jatropha curcas*, *Moringa oleifera*
- Algae

Possible invasive biofuel crops in Hawaii

- Guineagrass
- Chinese tallow tree
- *Jatropha curcas*
- Haole koa (*Luecaena* sp.)
- Kukui
- Castor
- Algae

Agronomic case study: *Jatropha*

Totals extrapolated from data taken in Kunia (Central Oahu) from field planted in Sept. 07. Numbers represent a per acre basis for 1,000 trees/acre. Assume 2.68 seeds per nut.

		9 month totals		
Flow Rate		India	Mada	HI
High	Nuts	51200	49300	34100
	Seeds	**137K**	132K	**90K**
Low	Nuts	41250	55600	73500
	Seeds	**110K**	149K	**197K**

Agronomic case study: *Jatropha*

- *Jatropha* sp. Includes over 180 species
- *J. gossypifolia* is highly invasive and toxic
- *J. curcas* often given invasive label due to toxicity and presence of invasive members within genus
  - Some worrisome char. → vegetative prop.

Agronomic case study: Jatropha

- Attempting to develop a system for automated production

- Direct-seeding, drip irrigation, minimum tillage

- Removal of fruits from soil surface, tree branches, or both

Balancing production with potential degradation

- Research in crop development must address ecological impacts
  - Focus programs to incorporate data collection on invasive nature of species
- Long-term cropping systems vs. short rotation systems
  - Questions of sustainable production
- Non-food vs. Food crops

Responsibility of research community

- Agriculturalists coordinate with weed ecologists
- Advocacy groups given input and updates on work with '2nd generation' crops
- Encourage public officials and agencies to establish protocol for new commercial operations where potential invasives are utilized
- Keep communities abreast of activities

Mahalo