



# Addressing a Growing Risk: Minimizing the Potential for Bioenergy Crops to Become Invasive

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# By solving one problem



Are we fueling another?



# Moving Beyond Corn Ethanol

1<sup>st</sup> Gen



2<sup>nd</sup> Gen

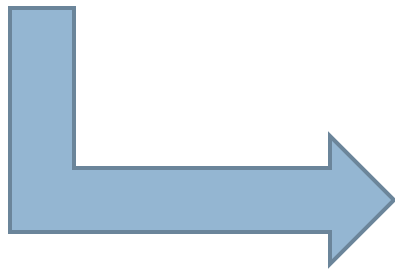


3<sup>rd</sup> Gen



# Incentives for 2<sup>nd</sup> and 3<sup>rd</sup> Gen

- Renewable Fuel Standard (RFS)
- USDA Biomass Crop Assistance Program
- State Renewable Portfolio Standards
- Federal agency research funding (DOE)
- Federal agency fuel procurement (DOD)



Tremendous interest in grasses, trees, and algae as sources for bioenergy, with particular interest in non-native and modified feedstocks

# Growth of New Feedstocks

- >225 new advanced biofuels projects currently under development (Advanced Biofuels Project Database, Dec. 2011)
- As much as 60-80 million acres could potentially be converted to dedicated energy crops (Billion Ton Update, 2011)

# What makes a good biomass crop?

	<b>Characteristic of an Ideal Biomass Crop</b>
Rapid growth rate	X
Resistant to pests and diseases	X
High water use efficiency	X
C <sub>4</sub> photosynthesis*	X
Perennial	X
High yields	X
Sterility	X
Ability to grow in a wide range of climates and habitats	X
Rapid regrowth or self-propagation	X

# Invasive bioenergy crops

- Growth of GMO crops
- “Sterile” species can be invasive
- Potential for native species to become invasive
- Importance of scale: large scale of plantings increases propagule pressure
- Issue has gone from obscure to making headlines
  - ▣ >200 scientists urge precaution
- Not going away anytime soon



# Dedicated Energy Crops: Coming to a Field Near You?

- ❑ Miscanthus
- ❑ Switchgrass
- ❑ Arundo donax
- ❑ Bamboo
- ❑ Napier grass
- ❑ Reed canary grass
- ❑ Eucalyptus
- ❑ Jatropha





# Harvesting existing invasives

- Highly problematic invasive plant species could potentially be harvested and used for biomass



Win-win



Pandora's box

Potential solution: mobile production units

# Regulation

- Federal and state regulations have been reactionary and piecemeal
- Often species are not listed as invasive until they have become a problem
- GMOs often escape regulatory review
- Executive Order 13112 – federal agencies should not authorize or fund actions that promote introduction or spread of invasive species
- Florida and Mississippi state law: non-native bioenergy crops must be permitted and bonded

# Case Study 1: Giant Miscanthus



- Widely grown in Europe for biomass
- Shown a great deal of promise in US
- USDA funding up to 300,000 acres as part of Biomass Crop Assistance Program (MO, AR, OH, PA, GA, SC, NC)

# Case Study 1: Miscanthus



- Low-risk WRA score
- Sterile seeds, fairly low rate of spread
- With proper precautions, likely to have fairly low risk
- **But, modified varieties with viable seeds may have much higher risk**



# Case Study 2:

## Arundo Donax- Giant Reed

- Fast growing, hardy
- Large amount of biomass
- 9-30 feet tall
- Bioremediator
- Seen as potentially good biomass crop: “possibly the finest bioenergy crop available”
- Currently being grown in FL, OR, NC, WV, TN



# Case Study 2:

## Arundo Donax- Giant Reed

- ❑ Listed as a noxious weed or invasive risk in at least 7 states
- ❑ Sterile seeds but spreads vegetatively: travels downstream during storms, alongside roadways, etc
- ❑ Ranked as likely invasive species on numerous WRAs



# Pending EPA Rule

- New rule would allow *Arundo donax* and napiergrass (*Pennisetum purpureum*) to qualify as “advanced biofuel feedstocks” under the Renewable Fuel Standard
- Would help to incentivize planting of known invasive species for biofuel
- Over 100 groups have publicly opposed this rule
- Currently pending at EPA- status unknown

# Arundo Donax: State level Issues

- Oregon- Boardman Power Plant
  - Portland General Electric to plant up to 90,000 acres of Arundo
  - ODA Rule- mandated BMPs, no floodplains
  - H.B. 2813 to list Arundo as noxious
- North Carolina – Chemtex Plant
  - \$99 million loan from USDA
  - ~15,000 acres potentially to be planted
  - 15 groups petition NCDA, fail
  - Voluntary BMPs



An aerial photograph of a wide, winding river with a light-colored, silty center and green banks. The river flows through a rugged, mountainous landscape with deep canyons and layered rock formations. The terrain is a mix of green vegetation and brownish-grey rock. The river's path is highly irregular, with several sharp turns and loops.

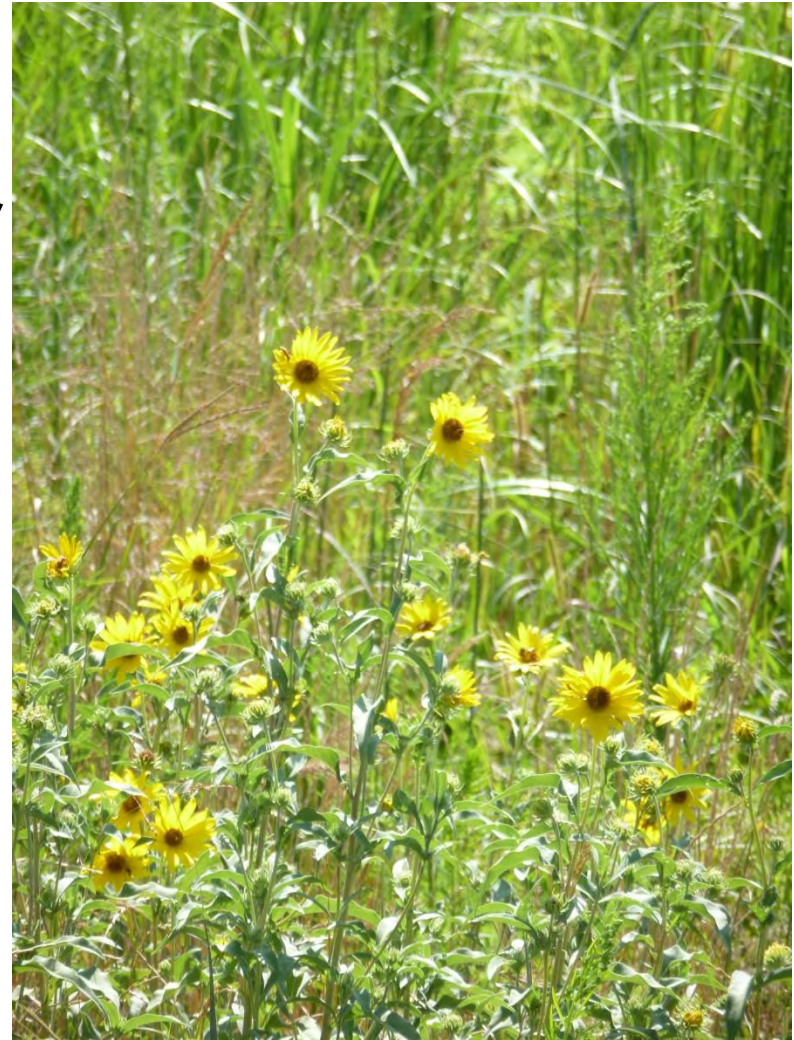
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# Recommendations

1. Prioritize use of ecologically beneficial feedstocks (native plants mixtures, waste materials, and sustainably collected forest residues)
2. Federal and state governments should use Weed Risk Assessment screening protocols and precaution in choosing feedstocks, particularly when funding bioenergy projects



# Recommendations

3. State and federal governments should implement rigorous monitoring, early detection, and rapid response protocols, paid for through insurance bonding.
4. Feedstock producers should adopt best management plans for all parts of the production process, including monitoring and mitigation to reduce the risk of invasion.
5. The federal government should assign liability to feedstock producers for damages and remediation

# Key Needs and Issues to be Resolved

- Hybrids, cultivars, varieties
- Where something is invasive
- Scientific name vs. common name
- BMPs
- Biofuels “White List” Approach

**Critical need for experts to engage in this issue,  
particularly on the state level**





We have an opportunity to prevent irreparable harm. By heeding sensible precautions, we can avoid the risk that bioenergy development will fuel the next invasive species catastrophe

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