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The Multiple Benefits of Poplar: **Sustainable Bioenergy Feedstock** and Environmental Co-Products

Patricia Townsend, Nora Haider, Bob Simmons, Brian Stanton, & Kevin Zobrist

WASHINGTON STATE

JIVERSITY





United States Department of Agriculture

GREENW

RESOURCES A Resource That Lasts ForeverTM

Today's talk

- About AHB
 - Renewable fuels and chemicals
 - Poplar biomass
- Challenges
 - Price of oil
 - Growers
- Solutions
 - Connect with stakeholders
 - Environmental services
 - Bio-based chemicals

Road ahead

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BIOMASS

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CARBON DIOXIDE

AHB is one of seven USDA AFRI "CAP" grants around the U.S.





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AHB is organized into five teams.



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AHB Renewable Fuels and Chemicals

Renewable Transportation Fuels

- Cellulosic Ethanol
- Drop-In Biofuels
 - Bio-Jet Fuel
 - Biogasoline
 - Renewable Diesel

Biochemicals

- Acetic Acid
- Ethyl Acetate
- Ethylene





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Poplar Bioenergy Crops

- Ideally grown
 - Non-irrigated
 - On marginal land
 - Near other feedstock
 sources



Demonstration Farms



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Why poplar?

- Jefferson, OR: September 15, 2015 – 2 seasons of growth after first harvest
- Clarksburg, CA: 13 feet in
 5 months after first harvest
- Long history of PNW poplar cultivation





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Harvesting Poplar





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Coppiced Poplar Production





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Biomass Yields Top Varieties

Site	1 st Harvest: Two-Years from Planting	2 nd Harvest: Three-Years from Coppicing	3 rd Harvest: Three-Years from Coppicing		
	BDT / acre / year				
Jefferson	5.0	7.0	7.0		
Hayden	4.5	7.0	7.0		
Clarksburg	5.0	8.7	8.7		
Pilchuck	3.0	5.7	5.7		
Mean	4.4	7.1	7.1		



Inventory and Weight Tables



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Biorefinery Locations and Lands to Poplar Trees



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Land Type/Use Converted to Growing Poplar Trees

	Pilchuck		Jefferson		Hayden		Clarksburg	
		share		share		share		share
	hectares	(%)	hectares	(%)	hectares	(%)	hectares	(%)
Pasture	51,000	73	77,000	93	75,000	59	19,000	35
Cropland, NIRR	9,000	13	5,200	6.5	28,000	22	1,500	3
Cropland, IRR	10,000	14	340	0.50	25,000	19	34,000	62
Total	70,000		82,540		128,000		54,500	
Top 3 crops converted	Hay, Tame NIRR	6	Hay, Tame NIRR	5	Beans, IRR	15	Corn, Sillage IRR	24
	Corn, Sillage NIRR	5	Oats, NIRR	1	Wheat, Winter NIRR	8	Wheat, Winter IRR	20
	Corn, Sillage IRR	4	Corn, Grain IRR	0.2	Hay, Tame IRR	5	Corn, Grain IRR	9



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Challenge 1: Economics



Challenge 2: Interest in Bioenergy

Where do we get the feedstock?

Survey of Grower Concerns:







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Solution 1: Connect with Stakeholders



Field tours – An excellent way to reach local policy makers



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Annual Field Tours

Summer 2016 tours

- Clarksburg, CA May 10
 - Jefferson, OR May 15
 - Pilchuck, WA May 31
- Hayden, ID June 7





+2+

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Solution 2: Environmental Co-products

Poplar for Environmental Uses





Biocycle Farm in Eugene, OR. Nearly 400 acres of poplars fertilized with biosolids and irrigated with recycled wastewater.

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Multiple Benefits



- Reduces wastewater treatment costs
- Keeps natural waterways clean
- Enhances poplar growth
- Produces a marketable crop



VIDEO: Poplar for Recycled Water Reuse and Phytoremediation <u>https://youtu.be/zIH-L3jfFmw</u>

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Other Environmental Uses

- Phytoremediation
- Riparian Buffer
- Riparian zone protection
- Slope stabilization
- Flood reduction
- Carbon sequestration
- Aquaculture effluent management
- Restore degraded land



Solutions 3: The Bridge to Biofuels

• Bioproducts for near term economic opportunities







Poplar and Willow Roadmap



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AHB Concluding thoughts

- Biomass
 - Biofuels
 - Co-products
 - Wood products integration
- Solutions
 - Wastewater management
 - Land Reclamation
 - Riparian buffers
- Road ahead



WE love poplar!

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About AHB

Connect with AHB

Get Involved

AHB Funding Questions & Answers Please complete this short questionnaire so that we are able to understand how you would like to be involved with AHB.

1. Which of the following best describes you?

Select... V

2. What interests you? (please select all that apply)

Growing biofuel feedstock	
Economic development in your community	\sim
New business opportunities	\sim
Educational opportunities	

(shift-click or command-click to select more than one item)

3. Would you like to receive our quarterly email newsletter?

Yes 🗸

4. How do you prefer to receive information? (please select all that apply)

Newsletters	
Printed publications	\mathbf{h}
Online publications	5
Workshops	Ť

(shift-click or command-click to select more than one item)

Questions.....





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