



Applying knowledge to improve water quality

Pacific Northwest

Regional Water Program

A Partnership of USDA CSREES
& Land Grant Colleges and Universities

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Assessing Water Needs:

Switchgrass as an Irrigated Biofuel Source in the West

Dr. Steve Fransen, a Washington State University scientist located at Prosser, is leading a USDA-CSREES funded National Facilitation Project which is assessing the potential of growing switchgrass and other grassy plants as biofuels on irrigated agricultural land in the western USA.

About five years ago world oil prices started increasing. Recently world oil was breaking price records daily. Americans started recognizing the need to develop our own biobased energy supply and become more energy independent of foreign oil imports. We think western irrigated agriculture will play a tremendous role in supplying part of American's bioenergy needs through oil seed crops for biodiesel and cellulosic biomass for liquid fuels. This is a new venture for everyone and requires developing new relationships between the feedstock producer (farmers) and the processor (biorefineries). The biorefinery needs an adequate supply of daily cellulosic feedstock biomass to maintain the refining process for a constant production of liquid fuels. Feedstock producers need an



Field trials on switchgrass conducted at Prosser, Washington.

adequate return on their investments while sustaining the environment and farm infrastructure. This new partnership, based on the need for locally grown and high tonnages of biomass, brings together two new worlds. To be competitive, to supply contracted feedstock biomass and to be sustainable, future irrigated cellulosic feedstock producers must increase feedstock water use efficiency through better technology based on new research findings, to consider using alternative water sources, to sustain high biomass yields and quality while keep production costs low. Without a reliable supply of feedstock biomass with high conversion efficiency to liquid fuels biorefineries could find themselves out of business. Imagine this new frontier of biobased energy as a three legged stool: one leg is the feedstock producer, one leg is the processor and the third leg is the consumer. All three legs need to be working properly to keep the stool strong. The focus of this new research project has the following objectives:

- ◆ To determine biomass and ethanol yield potential of perennial warm-season grasses grown under various irrigation rates in the western U.S.
- ◆ To determine changes in water use efficiency and consumptive water use of perennial warm-season grasses grown under different rates of irrigation water in the western U.S.
- ◆ To develop decision making tools for economically optimal irrigated biomass production for western U.S. growers.
- ◆ To develop educational publication materials with research-based recommendations to transition western bioenergy technology to potential western growers.

To accomplish project goals two locations were selected to represent the irrigated West. In cooperation with Dr. Mike Ottman warm-season grasses were established in 2008 on a Casa Grande Sandy Loam at the University of Arizona-Maricopa Agricultural Center, Maricopa, AZ. At the Washington State University Irrigated Agriculture Research and Extension Center (Prosser) grasses were established on a Warden Silt Loam soil. The research results will be widely



Pacific Northwest Regional Water Quality Coordination Project Partners

Land Grant Universities

Alaska

Cooperative Extension Service
Contact Fred Sorensen:
907-786-6311

<http://www.uaf.edu/ces/water/index.html>

University Publications:

<http://www.alaska.edu/uaf/ces/publications/>

Idaho

University of Idaho
Cooperative Extension System
Contact Bob Mahler: 208-885-7025

<http://www.uidaho.edu/wq/wqhome.html>

University Publications:

<http://info.ag.uidaho.edu/Catalog/catalog.html>

Oregon

Oregon State University
Extension Service
Contact Mike Gamroth: 541-737-3316

<http://extension.oregonstate.edu/>

University Publications:

<http://extension.oregonstate.edu/catalog/>

Washington

Washington State University
WSU Extension

Contact Bob Simmons:
360-427-9670 ext. 690

<http://wawater.wsu.edu/>

University Publications:

<http://pubs.wsu.edu/>

Northwest Indian College
Contact: Michael Cochrane:
360-392-4299

mcochrane@nwic.edu or

<http://www.nwic.edu/>

Water Resource Research Institutes

Water and Environmental Research
Center (Alaska)

<http://www.uaf.edu/water/>

Idaho Water Resources
Research Institute

<http://www.boise.uidaho.edu/>

Institute for Water and
Watersheds (Oregon)

<http://water.oregonstate.edu/>

State of Washington
Water Research Center

<http://www.swwrc.wsu.edu/>

Environmental Protection Agency

EPA, Region 10

The Pacific Northwest

<http://www.epa.gov/r10earth/>

Office of Research and Development,
Corvallis Laboratory

<http://www.epa.gov/wed/>

For more information contact
Jan Seago at 206-553-0038 or
seago.jan@epa.gov

The Project

Land Grant Universities, Water Research Institutes, and EPA Region 10 have formed a partnership to provide research and education to communities about protecting or restoring the quality of water resources. This partnership is being supported in part by the USDA's Cooperative State Research, Education, and Extension System (CSREES).

Our Goal and Approach

The goal of this Project is to provide leadership for water resources research, education, and outreach to help people, industry, and governments to prevent and solve current and emerging water quality and quantity problems. The approach to achieving this goal is for the Partners to develop a coordinated water quality effort based on, and strengthening, individual state programs.

Our Strengths

The Project promotes regional collaboration by acknowledging existing programs and successful efforts; assisting program gaps; identifying potential issues for cross-agency and private sector collaboration; and developing a clearinghouse of expertise and programs. In addition, the Project establishes or enhances partnerships with federal, state, and local environmental and water resource management agencies, such as by placing a University Liaison within the offices of EPA Region 10.

applicable because nearly all irrigated western warm-season grass producers and future biorefineries will fall within this latitude range.

Switchgrass has been in the news since President Bush mentioned this biofuel species in his State of the Union speech. Switchgrass has been successfully grown since 2002 for biomass/biofuel at WSU in Prosser. Based on research at WSU other perennial warm-season grasses shown to have feedstock potential that were included in this study are big bluestem, indiangrass, Eastern gamagrass and Kleingrass. A core of species and varieties were established at both locations in 2008. Under irrigation we receive two feedstock biomass harvests per growing season. An economic analysis of these results will be used to develop enterprise budgets that will be useful to both feedstock producers and biorefineries. This research is important because it will determine if biofuels have a place in the irrigated landscape of the western USA.

In addition to Drs. Fransen and Ottman, Dr. Troy Peters, an irrigation specialist at WSU (Prosser), is also participating in this important project.



National Water Quality Program Areas

The four land grant universities in the Pacific Northwest have aligned our water resource extension and research efforts with eight themes of the USDA's Cooperative State Research, Education, and Extension System.

1. Animal Waste Management
2. Drinking Water and Human Health
3. Environmental Restoration
4. Nutrient and Pesticide Management
5. Pollution Assessment and Prevention
6. Watershed Management
7. Water Conservation and Management
8. Water Policy and Economics

CSREES is the Cooperative States Research, Education, and Extension Service, a sub-agency of the United States Department of Agriculture, and is the federal partner in this water quality program.