



# Sun Grant Western Regional Center

Oregon State University

## Exploring Field Crop Biomass Sources for Use in Pacific Ethanol's Boardman, Oregon Cellulosic Ethanol Plant

Russ Karow, Oregon State University

### OVERVIEW

Pacific Ethanol, in Boardman, Oregon, is the recipient of a federal grant to establish a 1/10<sup>th</sup> scale cellulosic ethanol pilot plant adjacent to their existing corn-based ethanol facility. This new plant will require 40-50,000 tons per year of feedstock materials, a full scale facility 400-500,000 tons. While biomass needed for pilot plant operation can be readily obtained, full scale plant operation volumes seem problematic, but may be feasible with creative cropping system approaches. Dr. Karow and his multi-institution team will explore the possibility of delivering feedstock at the required level to the plant.

### Progress to Date

**Update from Pendleton, Oregon (dryland crops):** A study was initiated in April 2009 to investigate the combination of continuous winter cropping of forage triticale, continuous summer cropping of forage sorghum, and relay cropping of winter triticale and summer sorghum. The antecedent crop to this experiment was spring wheat. The wheat stubble was rotary mown in the autumn of 2008. A randomized complete block experiment with four replications of continuous cropping treatments was initiated on April 21, 2009. Barley biomass was harvested on July 1, 2009, when the crop was in the heading stage. Biomass on a dry weight basis averaged 2605 lb/acre. Given the late planting date this was a reasonable yield for biomass. Sorghum biomass was harvested on October 1, 2009. Sorghum ES5140 yielded an average dry biomass of 2494 lb/acre and sorghum ES5150 yielded 2380 lb/acre. Both cultivars of sorghum became severely drought stressed in mid July. The poor performance of the forage sorghum is probably due to low water storage in the soil profile because of below average precipitation in September, October and November. Winter triticale was sown on November 2, 2009 and will be harvested in mid April 2010.

**Update from Hermiston, Oregon (small plot relay cropping studies):** Corn yield data was analyzed on a wet weight and dry weight basis for planting dates starting in mid-June of 2009. The data suggest that corn – either long or short-season – does well in a very narrow window of time. Grain sorghum and forage sorghum do equivalently well. Data from carbon analysis has not been received back from the laboratory. As planting date progresses, short-season corn planted in narrow row spacings produced more dry matter than any of the other crops planted.

**Update from Prosser, Washington (sweet sorghum):** Sweet sorghum trials were seeded in May 2009. The plan was to harvest all sorghums about mid-October, but unfortunately a Labor Day wind storm changed that plan. The team chose to immediately harvest the plants rather than wait a month. Plant processing and data analysis are underway. The same trial will be repeated in 2010.

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\$500,000 in federal funds

## Progress to Date (cont.)

### **Update from Conservation Reserve harvest, near Boardman, Oregon:**

Three one-meter square samples of the biomass present at five different sites were collected and bagged. These samples were sent to USDA/ARS for analysis. The site contractor observed that feral rye appeared to out-produce all of the grass mixtures on the CRP sites.

### **Update from the Economics Group:**

Production budgets are being prepared for crops from which residue/forage is now being harvested in the Boardman area (which includes wheat, sweet corn, field corn, alfalfa, and green peas), as well as for crops currently being planted for forage following early season harvest of another crop (i.e., forage sorghum, Sudan grass or sorghum/sudan, and teff) and crops that may be planted as full season biomass crops (switch grass, and sweet sorghum). Work has begun on assessing ethanol's economic impacts in a given community. In the coming quarter, using a recently updated modeling system, the team will build an ethanol production function, which can be easily altered based on the feedstock, and then test it, contrasting the individual inputs approach to an industry approach.

### **Update from the Mapping Group:**

Base maps for the Boardman area have been generated as well as road-type overlays. Meetings were held with IRZ Consulting to obtain historic residue harvest data and field acreage information. Historic data are to be provided in January.

## Collaborators

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Industry Partners:

Harrison Pettit, Pacific Ethanol

Kent Madison, Madison Farms

Bill Levy, K&L Farms

Bud Wylie, CERES, Inc.

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