Regional Feedstock Partnership Highlights—Cereal Residue

Cereals for the purpose of this project were wheat, barley, oats, triticale, and rye as well as sorghum and millet grown for grain. In the last decade, these cereals have been annually grown on more than 55 million acres in the US. In the previous decade, combined acreage was over 80 million acres in some years. Cereals would appear to be an obvious source of biomass; acreages were large and spread across the nation and residues were left in the field. However, the vast majority of cereal acreage was grown under dryland conditions in areas with low to moderate rainfall and in environments where harsh winter or summer drought conditions could dramatically affect crop yields. In addition, it was known that many cereal growers participated in government crop support programs that required them to leave crop residues in place for soil conservation proposes. Without support program changes, these growers could not harvest residues for biomass purposes. Several research work areas were developed around these "expert opinions."

Residue Availability: A general conclusion that can be drawn from data mining performed as part of this project and from other work indicated that at least 3000 pounds of residue should be left on the ground for soil maintenance purposes. If mechanical harvest is then considered, agricultural engineers have estimated that at least 3000 pounds of residue is needed for efficient harvest. Combining these two values (total of 6000 pounds) suggests that a "net available" residue map should only include those areas of the United States where, using wheat as our surrogate, yields exceed 79 bu/a (79 bu x 76 lb straw per bu with an Harvest Index of 0.44 = 6004 lb straw). If a minimum 6000 lb value is indeed used, this narrows the areas available for sole-source wheat residue harvest to several dozen across the country.

Residue Maps: National Agricultural Statistics Service (NASS) county data was used to create grain yield maps. Harvest index values were then applied to these grain yields to generate predicted straw yield maps. Maps for the 1999-2008 time period for barley, oats, rice, sorghum, wheat and a combined straw total can be found at http://sungrant.oregonstate.edu/projects/cereal-residue. Maps have been generated that show areas of the US where straw yields are predicted to exceed 6000 lbs, our suggested minimum, over a 5 or 10 year period. Despite the vast acreages and nationwide production of cereal crops, there are few predicted locations for reliable biofuel production if cereal residues are used as the sole source of biomass. Site-specific information will be the key to use of cereal residues as a biomass source for biofuel production. Differential harvest in fields on a real time basis is now possible. In areas where grain yields are high but not quite high enough to allow for every year harvest of straw, differential harvest among fields over time may allow consistent biomass harvest in that area.

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