

BIOENERGY: AGRICULTURAL CROP RESIDUES

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The increasing cost of fossil fuels, especially natural gas and petroleum, and a desire to curtail greenhouse gas emissions are driving the expansion of bioenergy. Plant biomass, including woody, grain, and nongrain, are potential energy sources. Prior to the industrial revolution, plant biomass was a major fuel source for heating and cooking. The energy paradigm is shifting to renewable sources of energy, with agronomic and forest products expected to make a significant contribution. The United States is one of the largest producers and users of fuel ethanol, with corn grain the primary feedstock. Critics and proponents alike recognize that alone ethanol from corn grain cannot replace gasoline. Considerable financial and research efforts continue to go into the development of commercially viable cellulosic ethanol production. In addition, utilization of thermochemical platforms (e.g., gasification) is expanding. Regardless of the energy platform, biomass harvest must be conducted in a sustainable manner. The potential risks and benefits vary among the various feed-stocks. Nongrain biomass has other uses, such as animal feed and bedding, protecting the soil from erosive forces, and providing the raw material for maintaining and building soil organic matter. Excess harvest of crop biomass increases the risk of erosion, loss of soil organic matter, and thereby the risk of declining productivity. The amount of biomass inputs required to maintain soil organic carbon exceeds the amount required to limit wind and water erosion to soil tolerance levels. Soil and water conservation benefits must be included in any biomass assessment to prevent long-term environmental damage as the nation seeks near-term solutions to energy problems. Strategies to minimize potential negative impacts of bioenergy while striving to maximize benefits will be discussed.

KEY WORDS: crop residue, bioenergy, soil conservation, renewable energy

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