BALANCING FEEDSTOCK PRODUCTION AND SOIL RESOURCE PROTECTION *REAP - RENEWABLE ENERGY ASSESSMENT PROJECT*

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The ARS REAP team is a multi-location effort designed to quantify the sustainability of harvesting corn (*Zea mays* L.) stover and other materials for bio-energy or other bio-products. Our objectives are to: (1) determine the amount of crop residue needed to protect the soil resource, (2) compare short- and long-term tradeoffs for biomass as a bio-energy feedstock versus a soil carbon source, and (3) provide recommendations and guidelines for sustainable biomass harvest to the DOE, producers, and other cooperators. Effects of various crop residue harvest strategies on ecosystem services are being quantified by focusing on soil carbon changes and soil quality assessments. Plot, field, and watershed scales are being conducted to quantify many interactions between crop residue harvest strategies and management practices such as row spacing, plant population, fertilization rate, application of bio-char, and use cover crops. Among the metrics used for assessing impacts on ecosystem services, the Soil Management Assessment Framework (SMAF) is one tool that is being used to help interpret data from the various sites. This tool assesses measured data against potential or desired levels using various scoring functions. Initial REAP products have included a literature assessment of the amount of crop residue needed to sustain soil resources compared to the amounts needed to simply protect the resource from wind and water erosion. At the request of the NRCS to help validate RUSLE2, a multi-location study was conducted in 2007 to quantify the amount of corn biomass that would be left in the field for various cutting heights. In conjunction with on-going SunGrant research efforts, several REAP sites have developed partnerships with university personnel to quantify effects of corn stover harvest. This effort has resulted in a recommended soil sampling strategy and set of indicators to be measured before growing or harvesting any potential biomass feedstock. The same measurements are recommended for monitoring changes in the soil resource every 3 to 5 years. Strategies are also being developed to incorporate multiple biomass feedstock materials into integrated systems tailored to the topography and hydrology within the area.

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