

SUSTAINABLE BIOMASS REMOVAL RATES

J.M.F. Johnson, S.L. Weyers, D. Reicosky, and R. Gesch

North Central Soil Conservation Research Laboratory, ARS-USDA, Morris,
MN 56267, USA

Crop non-grain biomass (straw or stover) is a potential bioenergy feedstock suitable for thermochemical (controlled combustion) or fermentation for ethanol platforms. It is critical to prevent soil degradation; thereby, maintain soil's capacity to produce food, feed, fiber and fuel. Overharvest of crop straw can lead to soil degradation via loss of soil organic matter and accelerated erosion. The amount of biomass required on the soil to prevent loss of soil organic matter exceeds that needed to minimize erosion. Many physical, chemical and biological characteristics of high quality soils are related to soil organic matter. Information is needed on how much biomass is required on the land under different management systems to maintain or increase soil organic matter. Producers, energy industries, conservationists and policy-makers need a sound scientific basis for determining the balance of biomass use between soil protection and bioenergy production. Corn stover and cobs already produced in the Corn Belt will be the first used; but other biomass feedstocks will also be used. Research is underway to determine optimum rates for biomass return to the soil in a corn-soybean rotation to maintain soil organic matter in both chisel plow and no-tillage systems. Research is being conducted on providing additional biomass (e.g., cover crops or adding perennials in the rotation) when crop straw is harvested and on alternative biomass production systems (e.g., grass-based). The products of this research include: 1) guidelines for soil and crop management that are regionally appropriate and 2) decision tools (e.g., predictive equations) to determine the amount of crop residue that can be sustainably harvested. These projects are directly linked to the national ARS cross-location project; "Renewable Energy Assessment Project (REAP). The goal of REAP is to ensure that the soil resource indefinitely meets the demand for food, feed, fiber and fuel.

Contact: Jane Johnson, North Central Soil Conservation Research Laboratory, ARS-USDA, Morris, MN 56267, USA. Tel: 320-589-3411. E-mail: Jane.Johnson@ars.usda.gov.