



United States Department of Agriculture
Research, Education and Economics



Agricultural Research Service
Date: 4/16/2009

Natural Resources Research Update

ARS would like your feedback as to the value of this technical update. You can provide feedback about this specific update by responding to this email or send your comments to NRRU.update@ars.usda.gov and refer to technical update number: 238677

Title: Cropping systems with corn residue production levels sufficient to maintain or even improve soil organic carbon levels and allow partial removal for biofuel production.

Contributing Scientists: Gary Varvel, Wally Wilhelm, Jane Johnson, Doug Karlen, and Dave Lightle.

Locations: Agroecosystem Management Research Unit, Lincoln, NE; North Central Soil Conservation Research Laboratory, Morris, MN; National Soil Tilth Laboratory, Ames, IA; National Soil Survey Center, Lincoln, NE

Text: Increasing energy demands and prices, declining petroleum reserves, and political instability in oil-rich areas of the world, all call for greater use of domestically produced biofuels. Recent reports concluded that US agriculture and forest lands have the capacity to produce immense amounts of plant material needed for domestically produced biofuels. One of these materials, corn stover, was presented as a major feedstock available for biofuel production that could supply as much as 25% of the estimated feedstock needed by 2030, but can it be utilized sustainably. In a long-term high yielding irrigated environment in the western Corn Belt identified as one possible location where corn stover may be utilized, soil organic carbon levels were at or above initial levels in continuous corn, continuous soybean, and soybean-corn cropping systems after 14 years. In these systems, residue production was greater than 2.7 tons per acre in all systems, a level of residue production at or above that cited throughout the literature as the amount required for maintaining current soil organic carbon levels in many cropping systems. These results suggest that a portion of corn stover could be harvested for biofuel production without reducing soil organic carbon levels in similar high yielding systems.

Varvel, G.E., and W.W. Wilhelm. 2008. Soil carbon levels in irrigated western Corn Belt rotations. *Agronomy Journal* 100:1180-1184.

Wilhelm, W.W., J.M-F. Johnson, D.L. Karlen, and D.T. Lightle. 2007. Corn stover to sustain soil organic carbon further constrains biomass supply. *Agronomy Journal* 99:1665-1667. 2007.

As the principal in-house research arm of the U.S. Department of Agriculture, the Agricultural Research Service has a mission to: Conduct research to develop and transfer solutions to agricultural problems of high national priority and provide information access and dissemination to ensure high-quality, safe food, and other agricultural products, assess the nutritional needs of Americans, sustain a competitive agricultural economy, enhance the natural resource base and the environment, and provide economic opportunities for rural citizens, communities, and society as a whole.

The U. S. Department Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance. (Not all prohibited bases apply to all programs) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.