Section 11.1 Policy and Program Recommendations

1. Increase state agency and private sector efforts to educate farmers (and agricultural landowners) about the benefits—reduced CO_2 emissions, energy and dollar savings—associated with no-till agriculture and existing state and federal conservation programs.

Description

Agricultural tillage is a centuries-old practice, which allows farmers to aerate the soil, remove moisture-robbing weeds, and bury crop residue for fertilization purposes. Tillage also increases soil erosion, removing topsoil and increasing runoff of sediment, fertilizers, and pesticides in waterways.

No-till agriculture, as its name suggests, is an agricultural practice that minimizes soil disruption, leaving crop residue on the surface to act as a mulch. In addition to decreasing soil erosion,[1] no-till increases soil fertility and its ability to retain moisture and nutrients and decreases runoff of most fertilizers and pesticides which often leach into ground water supplies. No-till requires greater uses of herbicides, necessitating proper herbicide management to avoid groundwater leaching of poorly absorbed herbicides. Moreover, under no-till crop-rotation becomes even more important, as crop-specific diseases may remain within the past crop's debris.[2] During the first four to six years after switching to no-till, increased organic matter at the surface immobilizes nutrients and, therefore, requires application of more nitrogen fertilizer—up to 20 percent more.[3]

Some Kansas farmers have adopted no-till (or other reduced tillage practices) as a way to improve their overall profitability. One of the advantages of no-till is increased crop intensity (shortening the time a field is left fallow). Double cropping, harvesting two crops on the same acre in a year, results in a more diversified crop portfolio, which, in turn, mitigates the risks associated with price fluctuations and crop failure and spreads fixed costs over more crop acres.[4] No-till also reduces the usage of heavy machinery, resulting in a savings of approximately two gallons of diesel fuel per

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[1] Annual soil erosion of U.S. cropland decreased 43% from 1982 to 2003, with much of this reduction coming from conservation tillage practices such as no-till. John P. Reganold and David R. Huggins, 2008, No-Till: How Farmers Are Saving the Soil by Parking Their Plows, Scientific American, June 30, 2008: http://www.scjam.com/article.cfm?id=no-till (accessed July 2008)

[2] Kansas State University Agricultural Extension, 1999, Kansas No-Till Handbook: http://www.oznet.ksu.edu/library/crpsl2/sections/No-Till.pdf (accessed July 2008)

[3] John P. Reganold and David R. Huggins, 2008, No-Till: How Farmers Are Saving the Soil by Parking Their Plows, Scientific American, June 30, 2008: http://www.scjam.com/article.cfm?id=no-till (accessed July 2008)

[4] Kansas State University Agricultural Extension, 1999, Kansas No-Till Handbook: http://www.oznet.ksu.edu/library/crpsl2/sections/No-Till.pdf (accessed July 2008)

acre,[5] a significant savings with the high diesel prices seen through fall of 2008. Soil conservation and increased rainwater retention are other benefits, as well as reduced emissions of carbon dioxide and other pollutants associated with diesel fuel combustion.

No-till may also increase the ability of the soil to sequester carbon dioxide, the best known of the greenhouse gases associated with human activities. Only 40% of annual carbon dioxide emissions remains in the atmosphere; the rest is absorbed by vegetation in photosynthesis and then stored underground in what are known as terrestrial sinks. Because soil tillage disrupts these natural carbon dioxide sinks, cultivated soils are estimated to contain 25% to 50% less carbon dioxide than undisturbed soil, though actual rates of sequestration depend on soil type and regional climate.[6] Some estimate that converting the world's cropland to no-till could sequester 5 to 15 percent of annual global carbon dioxide emissions for the next 40 to 60 years.[7] In the U.S., terrestrial sequestration may have the potential to reduce annual emissions by 15 percent to 20 percent.[8] In most cases, no-till sequesters carbon only within the first few centimeters. A recent study of no-till's effects on soils in Kentucky, Ohio, and Pennsylvania found that in most instances the amount of carbon sequestered was no different than under regular tillage when deeper soil cores were taken.[9]

Despite these benefits, since 1990 the rate of conversion to no-till has been relatively slow in Kansas and in the rest of the surrounding states. In addition to a reluctance to change from traditional farming practices, adoption of no-till has also been hindered by the need for equipment modifications and for more information on crop rotations to maximize production.

Given the range of benefits associated with no-till agriculture, increasing education and outreach efforts may benefit Kansas farmers as well as the environment. Such public-private efforts could build on the existing efforts of Kansas State University's Agricultural Extension,[10] No-Till on the Plains, and the Kansas Farm Bureau.

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[5] Kansas State University Agricultural Extension, 2006, Terry Kastens et. al., Energy Use in the Kansas Agricultural Sector: http://kec.kansas.gov/reports/FinalReport_EnergyInAg_6_15_06.pdf (accessed July 2008)

[6] Rattan Lal, 2008, Carbon sequestration, Philosophical Transactions of the Royal Society B, v. 363, p. 815– 830.

[7] Rattan Lal, 2008. Carbon sequestration rates range from negative to zero in arid and hot climates to 1.1 tons of carbon per hectare in humid and temperate climates. Normal rates of carbon sequestration are estimated to be 0.3 ton to 0.5 ton of carbon per hectare.

[8] Charles W. Rice and Debbie Reed, 2007, Soil Carbon Sequestration and Greenhouse Gas Mitigation: A Role for American Agriculture, Kansas State University Department of Agronomy.

[15] Humberto Blanco-Canqui and Rattan Lal, 2008, No-Tillage and Soil-Profile Carbon Sequestration: An On-Farm Assessment, Soil Science Society of America Journal, v ol. 72, no. 3, p. 693–701.

[10] See Kansas State University Agricultural Extension, 1999, Kansas No-Till Handbook, page 3: http://www.oznet.ksu.edu/library/crpsl2/sections/No-Till.pdf (accessed July 2008).

Recommended Actions

a. Responsible parties

The Governor's Natural Resources Cabinet team.

b. Legislative action

No legislative action required.

c. Budget requirements

No additional funding required at this time.

d. Implementation timeline

Natural Resources Cabinet should set up an advisory group—consisting of relevant state and federal soil and water conservation staff, and private sector representatives, KSU faculty—to develop strategy for public education campaign.

Implications of Proposal

a. Pros

i. Decreased soil erosion.

ii. Improved surface water quality.

iii. Decreased energy costs.

iv. May lead to greater coordination and efficiency of existing government programs.

b. Cons

i. Increased herbicide costs.

ii. Requires farmers to modify or replace existing equipment.