

## Soil and Water Issues Related to Corn Grain Ethanol Production in Wisconsin

Environmentally sound production of renewable energy and biomass offers a significant economic opportunity for agriculture. The future of agriculture in Wisconsin depends on a robust farm economy, which may grow stronger with energy and fuel production. The Natural Resources Conservation Service (NRCS) supports corn-grain ethanol as an alternative fuel, with the probable conversion at some later time to cellulosic ethanol. Developing conservation systems for the sustainable production of energy crops is an NRCS agency priority.

**Situation:** The emerging markets and higher prices for grain corn intended to produce ethanol is encouraging farmers to use all possible means to increase corn production in Wisconsin. Increased numbers of acres are being planted to continuous corn to meet the demand. Some land formerly in soil conserving cover, such as sod, hayland, and pasture, is being planted to corn. Farmers are using increased tillage, fall tillage, additional fertilizer, and are planting odd corners and field borders to increase production because of the advantageous corn prices. The benefits of rotating crops – soil conserving crops in rotation, nitrogen credits from legumes, reduced need for pesticides – will be lost if we move toward a corn monoculture. Even with best management practices for erosion control, and nutrient and pest management, we face the risk of increased sediment and chemical residues in water with continuous corn production.

NRCS is committed to work with Wisconsin farmers to develop the conservation systems needed to face the challenges posed by crop production for biofuels.

Intensive cropping requires intensive conservation systems that are consistently followed to avoid significant soil and water degradation.

**Conservation Compliance:** Farmers may perceive the incentive to adhere to conservation compliance plans diminishes as commodity prices rise above rates that would trigger support payments. Farmers who are found out of compliance on highly erodible land and wetlands will risk their eligibility for USDA programs, including Disaster Assistance and Farm Loans. For many, the high corn prices may appear to outweigh these risks.

## Broad issues associated with increased corn production:

### Protecting Soil Quality

**Soil erosion** – Without increased use of conservation practices, increased tillage for continuous corn will result in increased erosion. Controlling surface water runoff becomes increasingly important, through grassed waterways, diversions, terraces, contour buffer strips and by seeding down headlands where erosion is known to occur.

- On slopes less than 6%, normal conservation practices (reduced tillage and grassed waterways) may control soil erosion.
- Fields with slopes between 6 and 12% require a system of conservation practices, such as no-till, contour buffers, terraces and grassed waterways.
- Fields with slopes greater than 12% are not suited to continuous corn production.

**Organic matter/soil carbon** – no-till planting will produce net gain in organic matter with corn for grain. Losses may occur if stalk/stover is harvested.

**Soil Tilth** – reduce tillage and manage heavy equipment traffic to minimize compaction.

### Protecting Water Quality

#### *Surface Water*

- Sediment delivered to streams will increase with more intense cropping and tillage if not supported with adequate conservation measures to keep soil in place.
- Phosphorous – erosion control and proper nutrient management is critical to avoid significant increases in phosphorous in surface water.
- Pesticide runoff – Integrated Pest Management (IPM) can be effective in reducing pesticide losses but can be difficult on a large scale. Continuous corn forfeits the rotation effect on pests and leads to increased use of pesticides. Even with IPM, there is increased risk of pesticide residues in soil and water with continuous corn.

#### *Groundwater*

- Nitrogen – elevated levels in groundwater are linked to areas of corn production.
- Pesticides – without crop rotations, more pesticides are needed and pose an increased risk of pesticide residues reaching groundwater.

## Conservation Solutions:

NRCS supports corn-grain ethanol as an alternative fuel, as well as other biofuels. However, significant soil erosion and water quality issues may arise unless the corn is produced in a sustainable manner. The conservation practices and technology exist to limit erosion and help protect water quality. Take the following steps to assure sustainable production and avoid soil and water degradation:

- Reduce soil erosion to “T” or tolerable levels
- Maintain a positive Soil Conditioning Index (above zero)
- Control surface water runoff with grassed waterways and other practices
- Protect headlands from gullying
- Establish grass buffers to protect uplands, streams and sensitive areas
- Rotate crops to reduce pesticide and fertilizer needs
- Follow a comprehensive conservation plan to avoid excess fertilizer use, runoff, and to identify risks to surface and groundwater.