

CARBON SEQUESTRATION

**Most Frequently
Asked Questions:**

What is meant by carbon sequestration?

Carbon sequestration is essentially the process of transforming carbon in the air (carbon dioxide or CO₂) into stored soil carbon. Carbon dioxide is taken up by plants through the process of photosynthesis and incorporated into living plant matter. As the plants die, the carbon-based leaves, stems and roots decay in the soil and become soil organic matter. This is the basic process called carbon sequestration.

How can carbon sequestration help reduce global warming?

Atmospheric carbon dioxide and other greenhouse gases act to trap heat that is reflected from the earth's surface. This buildup of heat could lead to global warming. Through carbon sequestration, atmospheric carbon dioxide levels are reduced as soil organic carbon levels increase. If the soil organic carbon is undisturbed, it can remain in the soil for many years as stable organic matter. This carbon is then sequestered or removed from the pool available to be recycled to the atmosphere. This process reduces CO₂ levels in the atmosphere, reducing the chances of global warming.

How much impact can carbon sequestration have on greenhouse gases?

It has been estimated that 20 percent or more of targeted CO₂ emission reductions could be met by agriculture soil carbon sequestration.

What can agricultural producers do to enhance carbon sequestration?

- a. No-till or reduced-till
- b. Increased crop rotation intensity by eliminating summer fallow
- c. Buffer strips
- d. Conservation measures that reduce soil erosion
- e. Using higher residue crops, such as corn, grain sorghum and wheat
- f. Using cover crops
- g. Selecting for varieties and hybrids that store more carbon

What can grazingland managers do to enhance carbon sequestration?

- a. Improve forage quality
- b. Regular use of prescribed burns to increase forage productivity
- c. Reduce overgrazing

Will agricultural producers get paid for carbon sequestration?

In parts of the world that have signed the Kyoto Agreement, carbon markets have already begun. In the United States a volunteer market exists called the Chicago Climate Exchange. It is possible that a private system of trading will be established, which could pay producers per hectare of management change or per ton of carbon sequestered. It is also possible that the government will provide certain incentives for producers to sequester carbon. In any case, carbon sequestration would increase soil organic matter due to:

- a. Improved soil structure and quality
- b. Improved soil productivity through increased organic matter
- c. Reduced erosion through improved soil structure
- d. Improved water quality through reduced erosion

What is soil organic matter, where does it come from and where does it go?

Soil organic matter consists of decomposed plant and animal matter. It helps bind soil mineral particles together into clumps, called soil aggregates. Higher levels of soil organic matter lead to more stable soil aggregates, better soil infiltration capability and aeration, better water-holding capacity, more resistance to wind erosion, reduced potential for compaction, and better overall soil fertility. Organic matter helps hold soil nutrients in place, so they are not lost to runoff or leaching. If left undisturbed, soil organic matter can eventually be transformed into long lasting humus, a very stable form of organic matter. However, if the soil is tilled, soil organic matter will be oxidized and carbon will be lost to the atmosphere as CO₂. If the soil eroded, organic matter will be removed with runoff water.

What affects the level of soil organic matter?

Native levels of soil organic matter for any particular site are determined largely by the latitude location on the earth and by the annual precipitation received. Native soil organic matter levels will generally increase as you move either north or south of the equator. In the Great Plains of the United States, organic matter levels increase from west to east following the precipitation gradient. Management by man can change the soil organic matter level. In general, as cropping intensity increases, soil organic matter increases. In addition, as tillage frequency increases, soil organic matter decreases. For Montana producers, eliminating periods of fallow and using no-tillage management practices provides a great potential to increase soil organic matter levels at a given location.

What is the economic feasibility or potential of carbon sequestration?

Economic potential is estimated by factoring the tradeoff between the additional costs of sequestering practices, relative to the additional returns from the carbon payments into farmers' adoption decisions. Models have predicted that farmers would adopt cropland management (primarily conservation tillage) at the lowest carbon price, \$10 per metric ton.

What is MSU doing to promote carbon sequestration?

MSU scientists are working to develop the best management practices that will promote carbon sequestration. Research is being done to test the effect of tillage, crop rotations, soil conservation practices, measuring and monitoring of soil carbon levels and economic and policy design.

What is CASMGS?

A team of scientists at 10 universities and government laboratories form the Consortium for Agricultural Soils Mitigation of Greenhouse Gases. With federal funding, this group will provide the science and technology necessary to help our nation realize the benefit of carbon sequestration. CASMGS brings together the nation's top researchers in the areas of soil carbon, greenhouse gas emission, conservation practices, computer modeling and economic analysis. CASMGS is also working with international scientists on carbon mitigation efforts.

Questions??

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