

THE FORAGER

Agronomics with livestock in mind!

Environmental Concerns Related to Soil Preparation: Soil Erosion

The major environmental concern related to soil preparation is erosion. Soil erosion is a natural process that occurs when the actions of water and/or wind cause topsoil to be removed and carried elsewhere.

In many agricultural areas, soil is eroding at a rate of several tons of soil per acre per year or higher. This includes both cropland and set-aside land in the Conservation Reserve Program. Forested and urban land is not included in many studies by the USDA-NRCS.

The good news is that soil erosion in the U.S. appears to be decreasing! From 1982-1997, soil erosion declined about 40% in the U.S., due to government conservation programs, technological advances, extension education efforts, and improving on-farm practices by producers.

Water erosion is caused by the erosive power of raindrops falling on the soil (particularly if the soil is not covered by vegetation or residue) or by surface runoff. Raindrops cause less severe forms of erosion (known as sheet and interrill erosion). Severe erosion problems such as rill erosion, channel erosion, and gully erosion can result from concentrated overland flow of water, such as is evidenced in areas where flooding occurs.

Wind erosion is primarily a problem in areas where the land is flat and more windy conditions seem to occur. It is particularly troublesome when the soil is not protected by some sort of residue cover. Wind erosion is a serious problem on cultivated organic soils, sandy coastal areas, alluvial soils along river bottoms, and other areas in the United States.

Soil erosion has both on-farm impacts: (a) a reduction in yield; and (b) farm income; and off-farm impacts: (a) contaminated water due to sediment; and (b) associated contamination from nutrients and pesticides carried on the soil particle. On-farm impacts due to the loss of soil and nutrients include:

- lower soil fertility levels
- development of rills and gullies in the field
- poorer crop performance and yield(s)
- less water infiltration into the soil
- more soil crusting
- more runoff in the spring and after storms

When fertile topsoil is lost, nutrients and organic matter needed by crops often are removed along with it. Erosion tends to remove the less dense soil constituents such as organic matter, clays, and silts, which are often the most fertile part of the soil. However, the loss in productivity

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caused by erosion has not been so evident in many parts of the U.S., since it has been compensated for over the years by improved crop varieties and increased fertilization. Soils can tolerate a certain amount of erosion without adverse effects on quality or long-term productivity, because new soil is constantly formed to replace lost soil. This tolerable level is known as "T" and generally ranges from 3 to 5 tons/acre per year. Goals for reducing soil erosion often use the "T" value as a target, because erosion rates below T should maintain long-term productivity of the soil.

Off-farm impacts occur when eroded soil is deposited elsewhere, along with nutrients, pesticides or pathogens that may be attached to the soil. The tolerable "T" value described above does not take into consideration the off-farm or downstream impacts. Soil eroded by water has effects such as:

- eroded soil deposited in depressions or adjacent fields
- decreased water quality downstream
- decline of downstream aquatic ecosystems due to sedimentation and the addition of nutrients, pesticides, and bacteria associated with the soil
- clogged drainage ditches and other costly problems

Off-farm impacts of wind erosion are due to blowing soil, which can reduce seedling survival and growth (seed cover), increase the susceptibility of plants to certain types of stress, contribute to transmission of some plant pathogens, and reduce crop yields. Dust also affects air quality, obscures visibility (which can cause automobile accidents), clogs machinery, and deposits in road ditches, where it can impact water quality.

We'll review ways to minimize soil erosion in our April issue. Soil conservation is everyone's responsibility and helps to salvage the land we need for producing quality forages and feeds.

(Edited from an article published by the USDA-NRCS)

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