USDA United States Department of Agriculture
Natural Resources Conservation Service

SOIL

Sheet and Rill Erosion

Sheet and Rill Erosion

Detachment and transport of soil particles caused by rainfall, melting snow, or irrigation.

What is it?

Sheet and rill erosion is the physical removal of soil from the land surface by the action of rainfall, melting snow, irrigation, and/or runoff. Sheet and rill erosion is not always readily visible, even when soil loss exceeds unsustainable levels. The loss of only $^{1}/_{32}$ of an inch can easily represent more than 5 ton/acre soil losses. Symptoms of soil erosion by water may be identified by small rills and channels on the soil surface, soil deposited at the base of slopes, sediment in streams, lakes, and reservoirs, and pedestals of soil supporting pebbles and plant material. Sheet and rill erosion can be apparent in different field situations especially on steep slopes and land that has been disturbed.

Why is it important?

Sheet and rill erosion removes surface soil material (topsoil), reduces levels of soil organic matter, and contributes to the breakdown of soil structure. This creates a less favorable environment for plant growth and productivity. Erosion removes topsoil, which often has the highest biological activity and greatest amount of soil organic matter. Nutrients removed by erosion are no longer available to support plant growth onsite, and when they accumulate in water, they may lead to algal blooms, lake eutrophication, and depleted dissolved oxygen levels that lead to fish kills. In soils that have shallow rooting zones, erosion decreases available rooting depth, which decreases the amount of water, air, and nutrients available to plants. The deposition of the eroded materials can result in crop losses, obstruct roadways, and fill drainage channels. This can have a negative economic impact on the farm and offsite.

What can be done about it?

Soil erosion can be avoided by increasing infiltration rates, maintaining a protective cover on the soil, and modifying the landscape to control runoff amounts and rates. To reduce sheet and rill erosion, reduce tillage, include high-residue crops, perennial and sod-forming crops in the cropping system, grow cover crops, manage crop residues to remain on the soil surface, and shorten the length and steepness of slopes. A systems approach of conservation practices is the best approach.

Sheet and Rill Erosion at a Glance

Problems / Indicators—Changes in soil horizon thickness, soil deposition in fields and water courses, and decreased organic matter	
Typical Causes	Examples of Typical Solutions
• Bare or unprotected soil • Soil disturbing activities such as tillage and construction site activities • Long and steep slopes • Significant and intense rainfall or irrigation events when residue cover is at a minimum • Decreased infiltration by compaction or poor soil structure	• Reduce tillage using residue and tillage management • Conservation crop rotations • Cover crops • Contour farming and contour buffer strips • Stripcropping • Terraces • Prescribed grazing