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Reduce Potential Soil Erosion Early in the Spring

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Abstract
Spring rains come with unexpected quantities and force, causing significant amounts of soil erosion to unprotected cropland. Spring is the most critical time for soil erosion because of degraded crop residue, tillage in preparation for planting and lack of crop canopy. Residue cover is not only good for preventing soil erosion, but it will cut down sediment transport to water bodies and contribute to the improvement of water quality.

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Integrated Crop Management NEWS

Reduce Potential Soil Erosion Early in the Spring

By Mahdi Al-Kaisi, Department of Agronomy and Mark Licht, Extension Field Agronomist

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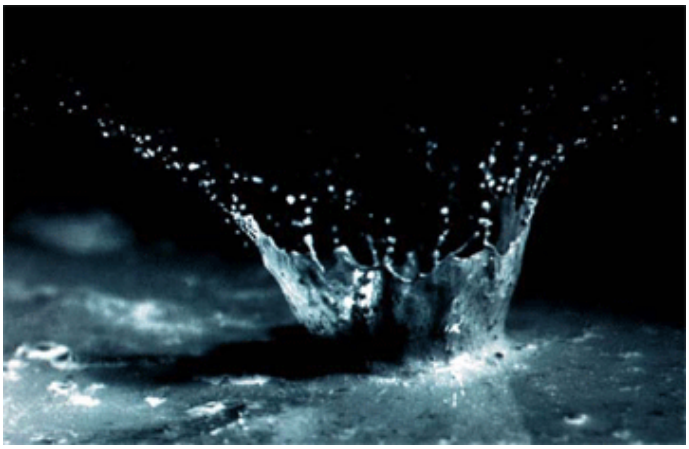

Raindrop splash and displacement of soil particles. Source: USDA Natural Resources Conservation Service.

Why is rainfall so destructive to bare cropland? In a normal rainfall, raindrops range in size from 1 to 7 millimeters in diameter and hit the ground going as fast as 20 miles per hour (see photo). The impact of millions of raindrops hitting the bare soil surface can be incredible, dislodging soil particles and splashing them 3 to 5 feet away (Figures 1 and 2). A heavy rainstorm may splash as much as 90 tons of soil per acre. However, the majority of the soil splashed is not immediately lost from the field. Most of the splashed soil particles don't leave the field; they clog surface pores which in turn reduces water infiltration, increases water runoff, and increases soil erosion.

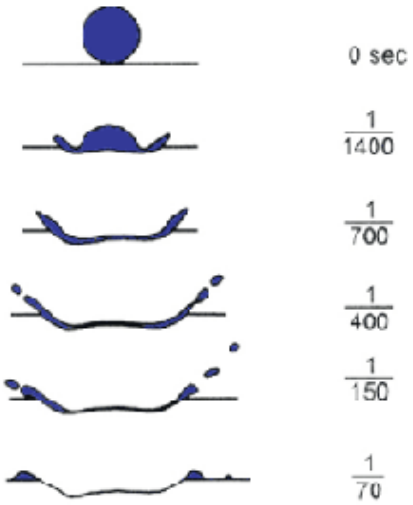

Figure 1. Sequential profile of a raindrop splash pattern. (Source: Environmental Soil Physics, Hillel)

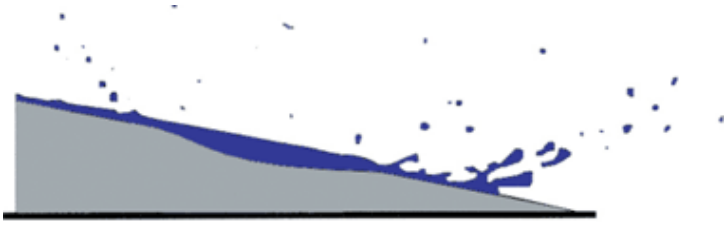

Figure 2. Raindrop splash pattern from a sloped landscape. Source: Environmental Soil Physics, Hillel)

After a rainfall event, soil crusting is a significant problem, particularly on soils with low residue cover. The surface crust is caused by a breakdown of soil aggregates due to raindrop impact. The raindrop splash detaches particles that fill soil pores. When rapid drying occurs, a hard crust layer can form in the top 2 inches of the soil. Soil crusting is troublesome when it develops prior to seedling emergence. Additionally, soil crusts create conditions that are extremely conducive to soil erosion during following rainfall events.

The use of a well-designed conservation system can limit exposed soil and rainsplash erosion. An effective conservation system also depends on the planning, observation and timing of operations. Spring is a good time to make observations and develop a new, more comprehensive conservation system.

Conservation systems to reduce raindrops' effect

Tillage and cropping management systems are critical components for reducing raindrop impact on soil particles due to the availability of crop residue to protect the soil surface. Excessive tillage can damage soil structure, leading to increased soil sealing and soil erosion. Conservation systems promote soil aggregates, infiltration, and soil tilth. Additionally, the improved soil structure of no-tillage and other conservation tillage systems stands up better against raindrops. A conservation system that includes high amounts of crop residue such as corn or fall cover crop traditionally provide abundant residue cover to protect the soil surface from spring rains.

Farmers are encouraged to assess residue cover since last fall's harvest and ask themselves the following questions: Was surface residue enough to prevent soil erosion? Is the surface residue cover distributed evenly across the field? Is there enough residue cover left after winter decomposition? If these questions can be answered no, then fall tillage passes and fall manure or anhydrous application need to be considered based on the

amount of residue and the residue distribution in the field. Remember that spring is the best time to evaluate conservation systems for their impact on improving soil and water quality.

Options for adjusting spring field operations

With spring weather and the most susceptible field conditions for water erosion here, what options remain before planting? Farmers should consider the effect of any additional tillage on remaining crop residue. If residue cover should fall below 30 percent, adjust your field operations to minimize potential soil erosion due to early spring rain. Options for steep slope areas include cover crops, permanent vegetation, strip cropping, and planting on the contour, all of which can reduce the speed of water runoff and slow soil erosion. If soil crusting occurs, consider using a rotary hoe to allow seedling emergence to occur unrestricted. The faster the crop is growing, the sooner a crop canopy will develop; a partial crop canopy is better than none at all.

Conservation structures such as terraces, grassed waterways, and field buffers are good components of a conservation system, which help in slowing water flow, settling out sediments, and directing water away from the field to a suitable outlet.

Remember that field observations in the spring can help in developing a more comprehensive conservation plan that greatly improves soil and water quality.

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