



Recent rainfall in northeastern Missouri has delayed corn planting. MU plant scientists are also concerned about increased topsoil erosion due to heavy rains. This 2012 photo shows flooded fields near Shelbina, Mo. Photo courtesy of Peter Scharf

Erosion Of Topsoil Can Permanently Reduce Farmland Productivity

COLUMBIA, MO.

As rainfall increases, the amount of topsoil decreases. So does the amount of grain the land can produce.

April's pounding rains likely took tons of topsoil from some Missouri farmlands, according to University of Missouri Extension plant sciences specialist Peter Scharf.

Across much of northern Missouri, an inch of soil loss in a corn-soybean rotation translates into a financial loss of \$14 per acre annually at today's prices.

That loss is essentially permanent, said MU corn specialist Brent Myers. One field Myers studied is estimated to have lost an average of 7.7 inches of topsoil in 120 years of production history.

Scharf calculates that this is a loss of \$107 per acre annually. "We could grow a lot more on these fields if we still had the original topsoil," he said. "Topsoil holds and delivers water to the crop so much better than subsoil."

In late April, MU plant sciences staff inspected farms in the Novelty and Monroe City areas for signs of topsoil erosion after 4-inch rains were recorded by weather stations operated by MU's Extension Commercial Agriculture Program.

Rainfall averaged 6.2 inches statewide in April, making it the fourth consecutive month with above-average precipitation.

Northeastern Missouri received more rain than the rest of the state. Rains pelted fields already soaked from rains that pushed streams and rivers along the upper Mississippi River out of their swollen banks and likely carried topsoil away.

"Erosion is worse on poorly drained and sloping farm ground where water is more likely to run off, carrying topsoil with it," Myers said. "Missouri really is a nexus of soil erosion risk. Marginal soils with reduced productivity are most at risk because crop residues are also reduced, leaving soil less protected from detachment by raindrops."

Soils with medium textures, such as those in northeastern Missouri, are particularly susceptible to erosion.

Scharf said Missouri's waning topsoil depth concerns him. The state has lost about half of its topsoil in the past century, he said, and if it continues to lose at this rate, clay-type subsoil will be all that's left. He said the once-fertile Vir-

ginia Piedmont region has been reduced to mostly scrub trees and a smattering of row crops since all the topsoil was lost to erosion. Likewise, the fall of ancient Greek civilization can be attributed in large part to the collapse of the agricultural system due to a loss of topsoil.

"We're on a course to lose all of our topsoil," Scharf said. "It's not what happens in one year. It's what happens over 100 years."

Scharf points to data from MU climatologist Pat Guinan that shows an increasing trend of daily heavy rain events – equal to or more than 3 inches – since the 1950s.

Guinan's research looks at these rainfall events from 1895-2010. The trend shows a 9 percent increase from 1953-2010 over the previous 58-year period. Four of the top five years with the highest number of daily heavy rain events have occurred since 1980: 1982, 1993, 2008 and 2009.

These heavy rains increase erosion greatly on both no-till and tilled soil, although no-till soils fare better. Myers and Scharf fear that recent wet springs have caused some producers to revert from no-till systems to tillage in order to fix erosion-damaged fields. They note that tillage just hides the problem and takes away the gullies, but the soil is still gone.

Terracing provides increased protection from runoff damage by reducing slope lengths and the energy of water available to carry soil off of fields, Myers said. Nevertheless, heavy rains have caused widespread damage to terraces and erosion in terraced fields during the last three springs.

Vegetative cover, dead or alive, will slow some soil loss. Scharf supports no-till farming and planting of properly managed cover crops, especially cereal rye. Costs will be offset by long-term protection of the soil, he said.

Scharf said it is important to plant cereal rye in time to get good fall growth. He suggests two weeks before the ideal time to plant winter wheat. This would be around Oct. 1 in central Missouri. Seeding with an airplane also provides a good option before row crops are harvested in the fall if the soil surface is moist. With this method, seeding should wait until leaf coverage begins to decline and 20 to 25 percent sunlight is filtering through the canopy to the ground. Δ