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About 75 percent of Kentucky's agricultural land is sloping enough that potential erosion losses must be considered in its management. In addition to the effect of soil erosion on water pollution is the question of its effect on the productivity of the soil. This is a complex question due to the interactions of the many factors that affect crop growth. Furthermore, the same degree of erosion has a greater adverse effect on some soils than on others. The kind of erosion that has taken place or is taking place is a major factor in making land use decisions for crop production.

Of the three major kinds of accelerated soil erosion--gully, rill, and sheet--gully erosion is the most spectacular, and where extensive it is the most damaging. The second kind, rill erosion, can be thought of as the formation of small gullies which can be concealed or repaired by normal tillage operations such as plowing or disking. Gully and rill erosion are both caused by concentrated surface flow of water downslope. Sheet erosion, the third major kind, is the removal of thin layers of soil from a wide area of a field by water or wind. While sheet erosion is the least noticeable, nationwide, it is probably the most damaging form of soil erosion. In sheet erosion, the impact of raindrops detaches the soil particles and sheet flow of water moves them downslope where most are deposited. Although not important in Kentucky, wind can cause similar losses of topsoil. As the topsoil gets thinner from erosion losses, the subsoil is mixed into the plow layer by tillage. This process has the greatest effect on sloping upland positions where the soils are usually mature. These are soils in which the clay content is considerably higher in the subsoil than in the topsoil or in which a pan has formed. Where sheet erosion has occurred on such soils and the subsoil has been mixed with the topsoil, the clay content of the topsoil is higher than normal. In some cases, it is nearly as high as in the subsoil. If the color of the subsoil is much different from that of the topsoil, it can be seen as a part of the plowlayer, and eroded areas are easily recognized in freshly plowed fields by the color of the soil at the surface.

An experiment conducted on a Maury soil near Lexington revealed different degrees of past sheet erosion. The experimental site was on a rather uniform slope of about 5 percent. It is thought that the site had been in bluegrass pasture without tillage for 50 - 60 years and that most of the erosion observed probably occurred over a period of

several years before the pasture was established. We sampled the soil in 0-3, 3-6, 6-12, and 12-18 inch depths and analyzed for clay content. The clay content in the 0-3 inch layer was the best indicator of the degree of past erosion. On this basis, the plot area was separated into three sections. The section of plots with clay content greater than 30 percent in the top 3 inches was designated as "eroded" and the section with 26 percent or less clay content was designated as "uneroded." There was a narrow strip of soil between those two sections where the clay content was between 26 and 30 percent, and these plots were excluded from subsequent comparisons.

The effects of erosion on the yield of corn grown by the no-tillage method and on the available water holding capacity for the 6-12 and 12-18 inch layers of soil were as follows:

	Uneroded	Eroded
Yield of corn (3-yr. average, bu/A)	99	87
Available water holding capacity[1/] (%)		
6-12 inches	23.7	17.3
12-18 inches	19.4	13.6

1/ Data is incomplete on 0-3 and 3-6 inch depths.

On the eroded section average yields were 12 percent less than on the uneroded section and the available water holding capacity of the upper subsoil (6-18 inches) was more than one-fourth lower.

In summary, removal of topsoil by erosion decreases the soil organic matter, which decreases the nitrogen supplying capacity and lowers the water supplying capacity of the soil. Mixing clay from the subsoil into a silty topsoil by plowing as the topsoil becomes thinner also lowers the water supplying capacity and results in less desirable physical characteristics in the plow layer of strongly developed soils such as the Maury. Thus, erosion generally diminishes some of the most important yield-determining soil properties. With a yield difference of the magnitude shown above in spite of the past history of a long period in sod, it appears that the damage caused by erosion to the productive capacity of the Maury soil is long-lasting, if not permanent.