

Prevent Gully Erosion



Summer 2015
Continuous Living Cover Series

Photo from National Soil Erosion Research Laboratory

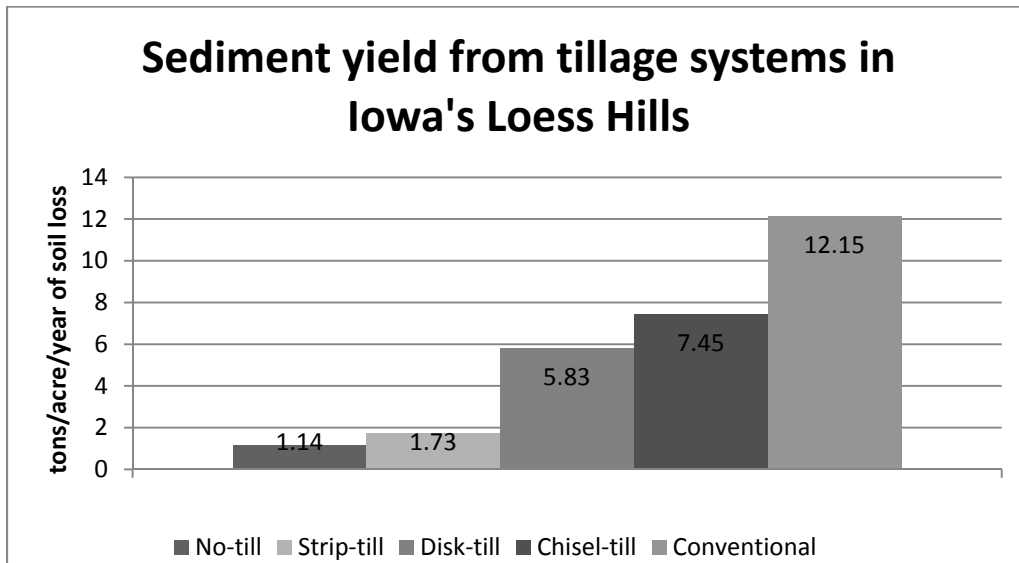
“The soil loss tolerance rate (T) is the maximum rate of annual soil loss that will permit crop productivity to be sustained economically and indefinitely on a given soil. Erosion is considered to be greater than T if either the water (sheet & rill) erosion or the wind erosion rate exceeds the soil loss tolerance rate.”

-- Natural Resources Conservation Service, NRCS
<http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/technical/nra/nri/?cid=stelprdb1041925>

Gully erosion means higher-than-expected soil losses

Research in Iowa is showing that gully erosion is sometimes under-accounted for by soil erosion estimates, and is a significant contributor to soil loss in cropped fields.

Simulations on test sites under several tillage systems in Iowa's Loess Hills showed soil loss rates higher or much higher than the Iowa state average of 5.42 tons/acre/year, which is already higher than the average T value of 5.0 tons/acre/year:



The Iowa Daily Erosion Project has been mapping daily rainfall and associated soil erosion for more than 10 years. Heavy rainfall events are becoming more common, and this project is demonstrating that some areas in Iowa have experienced 7 tons/acre in soil losses in a single day – well over the average annual soil loss per acre.

NRCS estimate of average soil loss on cultivated cropland as of 2010 (sheet and rill erosion):

Illinois – 4.00 tons/acre/year

Iowa – 5.42 tons/acre/year

Minnesota – 2.04 tons/acre/year

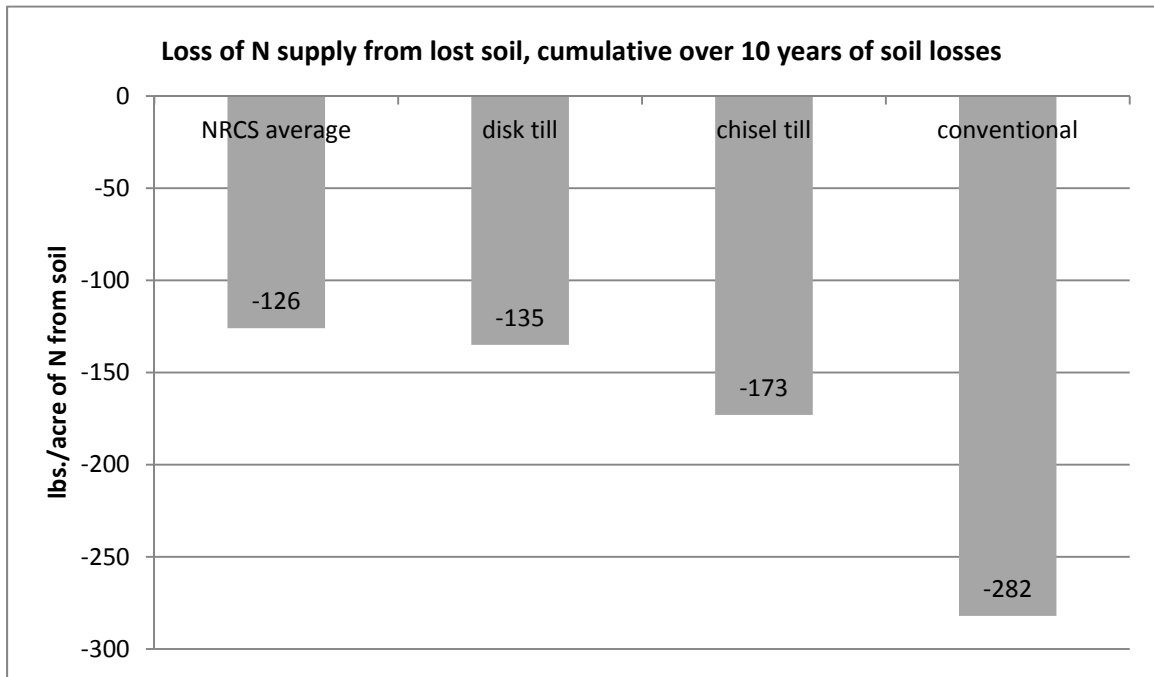
Wisconsin – 5.07 tons/acre/year

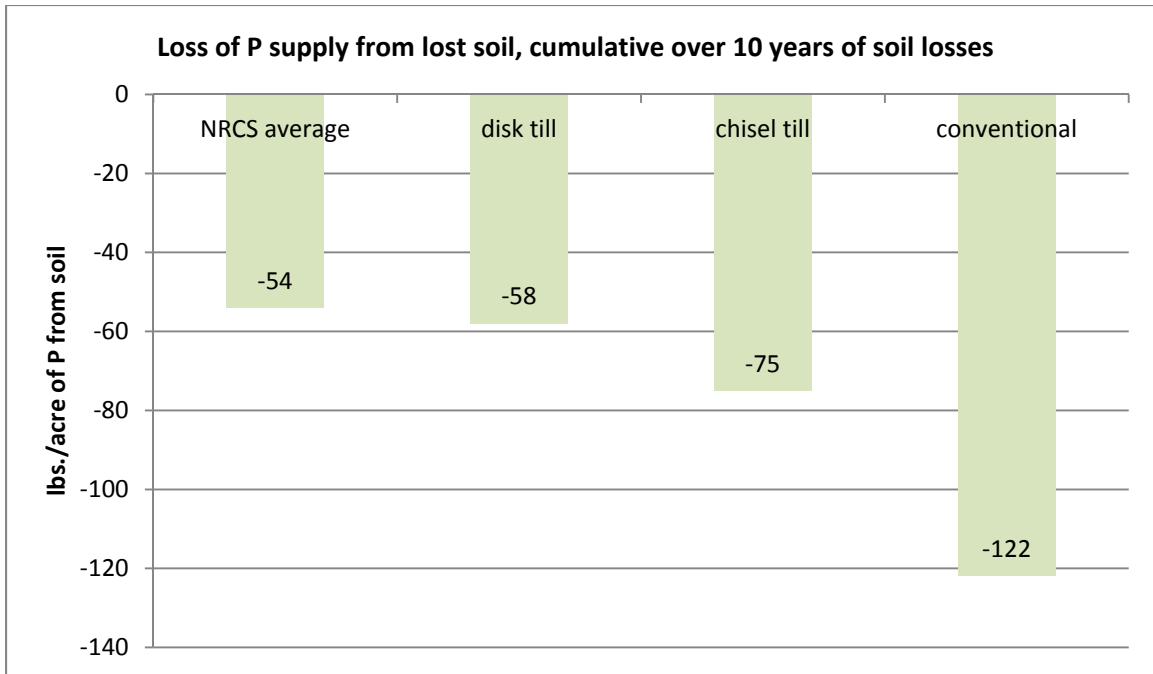
Dr. Rick Cruse at the Iowa Water Center estimates that soil loss due to gully erosion results in an annual loss of \$1 billion in Iowa, including crop yield losses and flooding cleanup costs.

Fertilizer value of lost topsoil:

Soil characteristic	Amount available per ton of soil per year
N	2.32
P	1

Losses of fertilizer value are cumulative, because once you lose the soil in one year, you lose the N and P that would have been available from it in every future year. This loss of soil-supplied N and P to the crop has to be made up by manure or purchased fertilizer inputs, or by the formation of new soil.





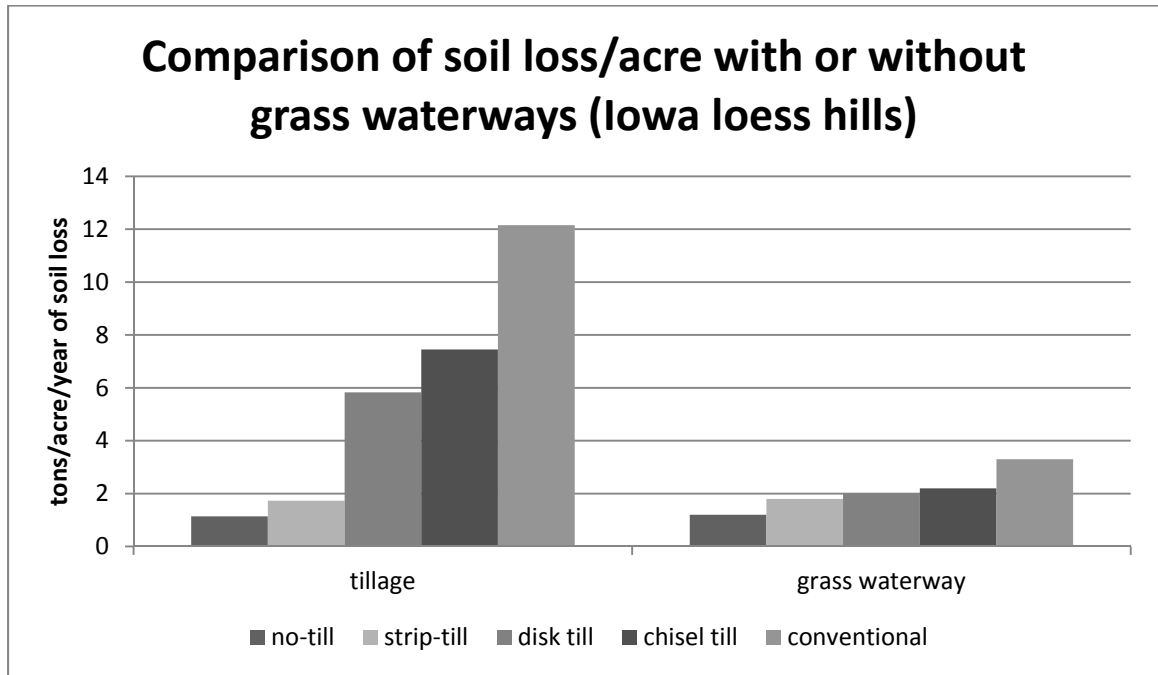
Reduced tillage clearly reduces soil erosion. However, reduced tillage alone may not be enough to prevent gully erosion in extreme rainfall events. Reduced tillage combined with Continuous Living Cover practices is needed to prevent erosion from the extreme rainfall events that are becoming more frequent.

Continuous Living Cover Practices to Help Prevent Gully Erosion:

- Cover crops on the ground in spring and fall, when heavy rains are common and row crops are not at full growth.
- Perennial forage in the crop rotation. A perennial forage stand can reduce erosion to near-zero in the years it is in place; and the residual root system in place after the crop is terminated can still help anchor the soil.
- Grassed waterways.
- Prairie strips in the crop fields.

The research in Iowa's loess hills showed that addition of grassed waterways could greatly reduce the soil loss from even the more intensively tilled fields. The prairie STRIPS research also shows large reductions in soil loss from fields due to the addition of relatively small strips of perennial vegetation, even if the crop fields are tilled. Farmers can balance tillage practices with Continuous Living Cover practices to achieve reduced

erosion in a way that works on their farm. Combining Continuous Living Cover practices with reduced tillage can reduce soil erosion to very low levels.



References:

The Cost of Soil Erosion. 2013.

http://www.extension.iastate.edu/ilf/sites/www.extension.iastate.edu/files/ilf/Cost_of_Eroded_Soil.pdf

Summary Report: 2010 National Resources Inventory.

http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1167354.pdf

Impact of Conservation Practices on Soil Erosion in Iowa's Loess Hills

https://www.extension.iastate.edu/NR/rdonlyres/26DC3619-5E13-4992-9F38-C104F60E6DBE/135600/Conservation_Practices_on_Soil_Erosion_Loess_Hills.pdf

Iowa Daily Erosion Project

<http://wepp.mesonet.agron.iastate.edu/GIS/erosion.phtml>