

The Concept of T For Establishing Soil Loss Limits

A Precedent For Setting Acceptable Limits of Natural
Resource Degradation

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T Value Defined

Soil loss tolerance is defined as the maximum rate of annual soil erosion that will permit a high level of crop productivity to be obtained economically and indefinitely.

The assigned T Factor is not used as a factor in any erosion prediction equation. It is the target value which erosion calculations use to determine whether a management system is or is not sustainable.

The intense nationwide soil conservation movement, initiated in the United States in the 1930's, included a strong quest for practical knowledge about why and how soil erodes.



Photo by Lynn Betts

Professional soil conservationists realized that a quantitative standard was needed to evaluate the effectiveness of erosion control measures (Johnson, 1987).



Photo by Lynn Betts

Smith (1941) was one of the first to express a need for a quantitative erosion control standard as 'that rate which will permit at least a constant or preferably an increasing time gradient of soil fertility.'

Early Work

- Hays and Clark (1941) concluded that soil erosion on a Fayette silt loam should be kept under 3 tons/ac/year.
- At this rate, it would take 50 years to remove 2.5 cm.
- Farmers could regard such a loss as reasonably safe.

Early Work

- Browning (1947) identified for 12 Midwest soils the 'maximum average annual permissible soil loss without decreasing productivity.'
- Erosion loss is more serious on soils with heavy infertile subsoil than on loess soils with uniform texture.
- The main determining factor was the loss of productivity per 2.5 cm of soil lost through erosion.

Early Work

- From sketchy data, it was estimated that in permeable, medium textured soils, in well managed cropland, an A horizon can form at the rate of 2.5cm in 30 years (Bennett, 1939)
- Soil loss tolerances were assigned to key soils in the Midwest by 1948 based on the judgment of the best informed soil scientists.

History of NRCS Guidelines

- Guidelines for T value were formulated in the early 1960's after about 15 years of discussion by soil scientists, agronomists, and others.
- In 1961 and 1962, SCS held six regional soil loss prediction workshops attended by agronomists, geologists, and soil conservationists.
- At these workshops the 5 ton/acre maximum tolerance was set.

History of NRCS Guidelines

- The procedure used in assigning T value has relied strictly on multiple judgments of informed scientists (Edwards, 1962).
- Stamey and Smith (1964) proposed an equation to derive the tolerances, but it was not adopted because of the difficulty in quantifying the variables.

History of NRCS Guidelines

- Current SCS guidelines for T value were distributed by SCS in 1973 (McCormick, 1982)
- This advisory notice requested SCS State staffs to update soil erodibility (K) and T factors according to the 1962 guidelines.

Soil Loss Tolerance Value

<u>Soil Series</u>	<u>Soil Taxa</u>	<u>Early</u>	<u>Current</u>
		<u>Tons/acre/year</u>	
Fayette silt loam	typic hapludalfs	3	5
Ida silt Loam	typic udorthents	6	5
Marshall silt loam	typic hapludolls	5	5
Clarion loam	typic hapludolls	4	5
Shelby loam	typic argiudolls	3	5
Dubuque loam	typic hapludalfs	2	3

From McCormick 1982

History of NRCS Guidelines

- Before 1977, prevention of off-site damage by sediment was commonly cited as a basis for the 5 tons/ acre/year maximum T value (McCormick, 1982).
- Since 1977, exclusion of this factor has been under study because, for many watersheds, soil erosion limits that might be required to meet water quality standards differ widely from those necessary for maintaining soil productivity.



Photo by Lynn Betts

History of NRCS Guidelines

- In 2003, NRCS received an oral request from the Farm Services Agency (FSA) for a way to provide national consistency for soil interpretations that are used in USDA programs.
- FSA maintained that more than 60 percent of the costly legal challenges to programs are due to inconsistencies of specific soil interpretations across state and county boundaries.

History of NRCS Guidelines

- FSA mentioned K, T, and I Factors and others like Hydrologic Soil Groups as being inconsistently assigned.
- NRCS agreed to develop national protocols to assure national consistency in these soil interpretations.

Future Plans

- NRCS National Bulletin 430-9-1 dated October 2, 2008 requests that States test recently updated T Factor criteria and calculations by December 30, 2008.
- The calculations will ensure national consistency in assigned T Factors.

Future Plans

- An implementation plan to roll out the nationally consistent T Factors for use in USDA programs will be developed during Fiscal year 2009, with full implementation scheduled for January 1, 2010.

Questions???