

## chapter two

# Soil erosion and soybean production

Glover B. Triplett and Seth M. Dabney

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### Introduction

Erosion is a natural process. Geologic forces constantly uplift land from the sea and when this happens erosion begins. Rocks and other parent material weather and disintegrate to release nutrients and to form soil. This soil supports vegetation which covers the land surface. Vegetation slows but does not stop the erosion process. Under these conditions, an equilibrium is established between soil loss and soil formation. This stabilizes the soil

Table 2.3 A Comparison of C Factors for USLE Equation for Various Soybean Production Systems in Mississippi

	C-Values
1. Continuous soybeans, no-till, Rdl (4000+ lb.), WC	0.040
2. Continuous soybeans, no-till, Rdl (<4000 lb.), WC	0.050
3. Soybeans no-till, doublecropped with small grain or ryegrass, Rdl (4000+ lb.)	0.060
4. Soybeans no-till, doublecropped with small grain or ryegrass Rdl (<4000 lb.)	0.070
5. Soybeans stubble planted, WC, Rdl (3000+ lb.), maximum 2 cultivations	0.100
6. Soybeans stubble planted, WC, Rdl (<3000 lb.), maximum 2 cultivations	0.130
7. Soybeans broadcast or drilled, no fall plowing, Rdl, WC, seeded preparation	0.140
8. Soybeans broadcast or drilled, no fall plowing, Rdl, WC, seeded preparation, April 15	0.150
9. Soybeans conventional planted, Rdl (3000+ lb.), no fall plowing, WC, seeded preparation, April 15, maximum 2 cultivations	0.180
10. Soybeans conventional planted, Rdl (<3000 lb.), no fall plowing, WC, seeded preparation, April 15, maximum 2 cultivations	0.200
11. Soybeans conventional planted, Rdl (<3000 lb.), WC, no fall plowing, seeded preparation, April 1, maximum 2 cultivations	0.220
12. Soybeans conventional planted, Rdl (<1500 lb.), WC, no fall plowing, seeded preparation, April 15, maximum 2 cultivations	0.280
13. Soybeans conventional planted, Rdl (<1500 lb.), WC, no fall plowing, seeded preparation, April 1, maximum 2 cultivations	0.320
14. Soybeans conventional planted, no fall plowing, Rdl (<1500 lb.), WC, seedbed preparation, March 15, maximum 2 cultivations	0.380
15. Soybeans conventional planted, no fall plowing, Rdl (<1500 lb.), WC, seedbed preparation, March 1, maximum 2 cultivations	0.420

WC = volunteer winter cover; Rdl = residue left.  
From NCRS.

Table 2.4 C Factors and Annual Soil Loss from Brown Loam Soil Region Plots with 5% Slope

Crop	Conventional-till		No-till		Ref.
	C factor	Soil loss, ton/acre/year	C factor	Soil loss, ton/acre/year	
Sorghum	0.04	4.2	0.005	0.6	McGregor and Mutchler (1992)
Corn (grain)	0.09	7.2	0.005	0.4	McGregor and Mutchler (1983)
Corn (silage)	0.14	11.2	0.003	0.3	McGregor and Mutchler (1983)
Soybean	0.12	21.1	0.006	1.2	McGregor (1978)
Soybean	0.10	19.6	0.008	1.4	Mutchler and Greer (1984)
Cotton/vetch <sup>a,b</sup>	0.13	9.6	0.010	0.8	Mutchler and McDowell (1990)
Cotton <sup>b</sup>	0.31	31.2	0.053	5.4	Mutchler et al., (1985)

<sup>a</sup> With hairy vetch winter cover crop.

<sup>b</sup> Average of two treatments with differing previous soil management histories.

### Practices

Practices, *P*, represent another means to manage soil to reduce erosion loss. These include such techniques as terraces, farming on the contour, buffer strips, and grass hedges (Meyer and Mannering, 1967, Mutchler et al., 1994). Strips of close-growing crops or grass hedges slow water movement and greatly resist erosion because of the closely spaced stems, causing larger soil particles to be deposited the same way as behind terrace impoundments

(Dabney et al., 1993a) as important means practices, indicating

### Applying the USLE

In calculating the erosion, the *R*, *K*, *LS*, and *P* factors are multiplied. For example, on a silt loam and want to plant on March 15 and cultivated made to plant on t (A = RKLSCP) are

$$\begin{aligned} R &= 350 \\ K &= 0.43 \\ LS &= 0.70 \\ C &= 0.38 \\ P &= 1.0 \end{aligned}$$

In solving the equation

or  $A = 40$  tons/acre  
If the product

A

which is still too high  
If the product  
plant on the contour

which is slightly lower  
If another factor  
the *LS* factor be

or 8.6, which is  
for fields with

### Crop management

Complete elimination of erosion on undisturbed areas can be to a level that is over a long period of time the soil in question. However, long-term management practices reduces the flow of exposed soil and