Estimating Your Soil Erosion Losses with the Universal Soil Loss Equation (USLE)

Cooperative Extension Service ■ College of Agriculture
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Excessive soil erosion occurs on 40 percent, or 9.6 million acres, of Illinois cropland. Erosion on this land exceeds the soil loss tolerances of one to five tons per acre annually, with a high of over 50 tons per acre and an average of 11.7 tons. In addition, 23 percent, or 700,000 acres, of pastureland and 16 percent, or 600,000 acres, of woodland have excessive soil erosion.

The loss of valuable topsoil to erosion is compounded by the loss of plant nutrients and organic matter and by more difficulty in tilling since the soil becomes increasingly clayey as more subsoil is brought to the surface. But the problems of erosion are not confined to farmland. The sediment that leaves fields often has an adverse effect on the water quality and condition of drainage ditches, lakes, reservoirs, and streams. Many types of problems arise: sediment decreases the storage capacity of lakes and reservoirs, clogs streams and drainage channels, causes deterioration of aquatic habitats, increases water treatment costs, and carries displaced plant nutrients.

Illinois Erosion Control Program

In response to the accelerated loss of soil productivity and to the off-the-farm effects of erosion, the state of Illinois has designed an erosion control program. The goal of this program is to reduce annual soil erosion losses on all agricultural land to one to five tons per acre by the year 2000 depending upon the soil type. This rate of erosion is considered the soil loss tolerance level (the T value). Where erosion exceeds the T value, soil is being lost so fast that the land's natural productivity is being diminished. Table 1 lists the T value for most Illinois soils (all tables are given at the end of the text).

The erosion control program is divided into intermediate goals, all leading up to the year 2000. To begin the program, the 98 soil and water conservation districts in Illinois developed soil erosion standards for all soils in their districts. The districts' standards, which went into effect on January 1, 1983, were required to be at least as stringent as the state's guidelines, although some districts developed standards stricter than the state's guidelines.

The state's guidelines are as follows:

- By January 1, 1983, erosion on all farmland could not exceed four times the T value (4 to 20 tons per acre annually) established for the soil type.
- By January 1, 1988, soil loss cannot exceed two times the T value (2 to 10 tons per acre annually). Where conservation tillage would solve the erosion problem and the slope is less than five percent, however, soil loss must not exceed the T value (1 to 5 tons per acre annually).
- By January 1, 1994, erosion on all farmland cannot exceed one and a half times T (1½ to 7½ tons per acre annually).
- By January 1 of the year 2000, erosion cannot exceed the T value (1 to 5 tons per acre annually) on any Illinois farmland.

Although the soil and water conservation districts are delegated the task of administrating the erosion control program, it is, as of November, 1983, still voluntary. There is, however, a clearly defined complaint process. It is always possible that the program will become mandatory if the voluntary approach does not work.

The Universal Soil Loss Equation (USLE)

The Universal Soil Loss Equation (USLE) provides a convenient way for you to estimate the rate of soil loss on your land so that you can see how that rate compares with your district's standards. The USLE takes into account the major factors that influence soil erosion by rainfall: rainfall patterns, soil types, slope steepness, and management and conservation practices. It was developed by the Agricultural Research Service, the state experiment stations, and the Soil Conservation Service (SCS), using research data from many research stations, including work at Dixon Springs, Urbana, and Elwood, Illinois. More than 10,000 plot years of data were analyzed and used to develop the equation in the early 1960s. Additional data, mainly from rainfall simulator plots, have been added to the equation in the latest revision. Most of the recent data covers conservation tillage, reduced tillage, till-plant, and no-till systems.

The USLE represents the average annual rate of soil loss due to splash, sheet, and rill erosion. It does not estimate soil erosion from gullies or stream banks or the amount of sediment reaching streams. Moreover, the equation only gives the estimated average annual splash, sheet, and rill erosion for the specific field segment for which you have determined the appropriate factors. It will not reflect the average soil erosion rate for the entire field unless

the segment you chose represents the field. In general, however, you should *not* select a "representative" field segment, but the field segment where erosion is generally more severe. Taking estimates on several field segments will give you a better idea of the scope of your erosion problems. However, do not take an average of the several estimates because that may mask the severity of erosion on a particular segment.

The equation is simple to use. Once you have determined the values for each of the five factors, you multiply them using a pocket calculator or, if you prefer, pencil and paper. The equation is:

$$R \times K \times LS \times C \times P = A$$

where R = rainfall factor
K = soil erodibility factor
LS = length and steepness of slope factor
C = cropping and management factor
P = conservation practices factor
A = the computed average annual soil erosion loss in tons per acre

Once you have determined A, you can compare it with the T values in Table 1 and with your Soil and Water Conservation District's standards. You also can use the equation to evaluate the effect that various changes in your farming practices would have on your soil loss rate. Keep in mind, however, that A is only as accurate as the values that you have chosen for the five factors. In general, if you have used reasonable care in selecting the factors, A should be within a range of plus or minus 20 percent of your actual average annual erosion on the field segment.

Rainfall (R) Factor

R represents the erosion potential inherent in the rainfall patterns of a particular area. The factors were developed from U.S. weather data taken at many different locations in the eastern United States over a 22-year period. The erosive potential of rainstorms increases as one moves from northeastern Illinois to extreme southern Illinois. See Figure 1 for the R value in your area.

Soil Erodibility (K) Factor

K reflects the fact that various soils erode at different rates because of different physical characteristics such as texture, structure, organic matter content, and soil depth. K values for Illinois range from a low of 0.15 on sandy soils to a high of 0.43 on highly erosive soils.

If you have a detailed soil map of your farm, find the soil type for the specific field segment or segments that you have chosen, and determine the K value from Table 1. Soil maps are available for about one-half of all Illinois counties, and many individual farm soil maps have been prepared for counties without published soil surveys. Check with your SCS district conservationist about any maps for your farm.

If a detailed soil map is not available, your district conservationist can help you determine the proper K value, or you may use Table 2 until more accurate information is available. Table 2 allows you to determine rough K values from your judgment of the soil's color and permeability. Most Illinois soils with an erosion problem will have K values of 0.28, 0.32, 0.37, or 0.43.

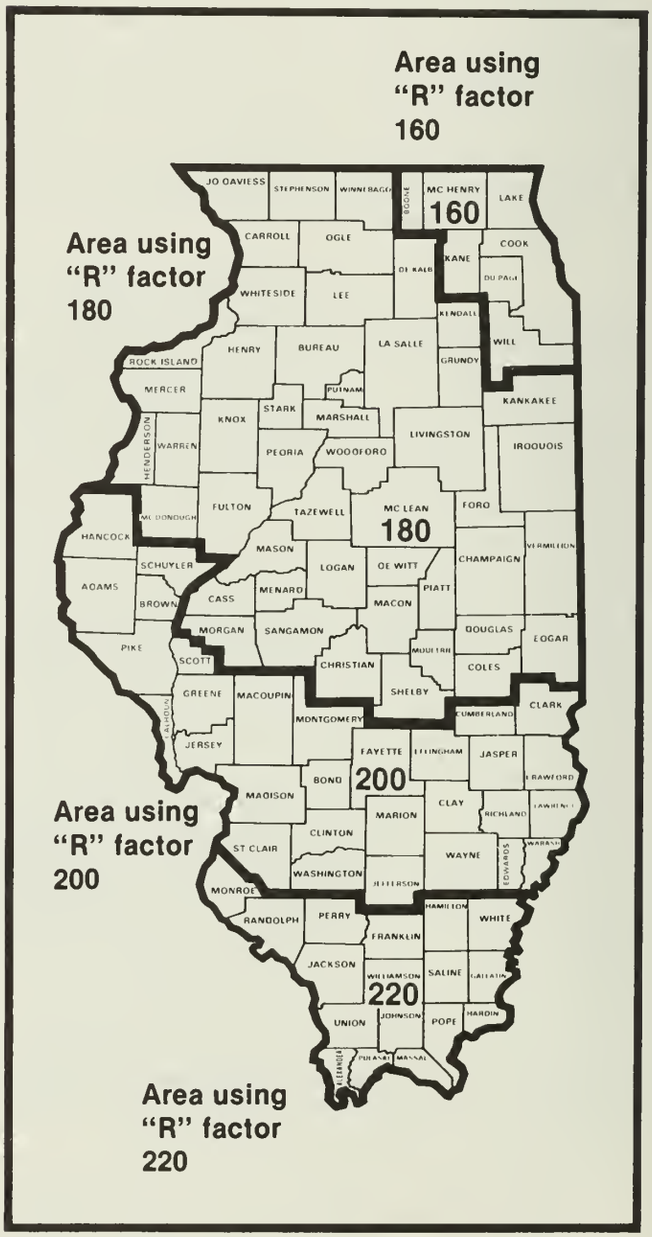


Figure 1. Rainfall (R) values.

Slope Length and Steepness (LS) Factor

LS represents the erosive potential of a particular combination of slope length and slope steepness. Slope length is *not* the distance from the highest point in the field to the lowest point. To determine slope length, you must walk the field and determine where water will flow. Disregard contour farming channels and concentrate on natural flow patterns. Once you have identified the natural flow patterns, determine the point on the slope where the flow begins. The slope length is then the distance from this point to the point where (1) the slope gradient decreases enough that sediment deposition generally occurs, or (2) the runoff water becomes a concentrated flow, or (3) the runoff enters a well-defined channel, for example, part of a natural drainage network or a constructed grass waterway or terrace channel.* There is a tendency to overestimate slope length. Slope lengths will seldom be above 400 feet long on gentle slopes and will usually be shorter on steeper slopes.

Slope steepness is expressed as a percentage. The percentage of slope is the change in elevation between two points divided by the horizontal distance between the two points times 100. For example, if the elevation change is 6 feet in a horizontal distance of 120 feet, the slope has a 5 percent grade ($6 \div 120 \times 100 = 5$). Percent slope can be determined with an engineer's level, a hand level, a line or string level, or a sighting board slope finder like the one on page 19 (instructions for using it are on page 17).

Once you have determined slope length and steepness, you can find the LS value in Table 3. Please note that slope classifications given in detailed soil maps should not be used; they are too general. The slope length and steepness must be determined on the specific segment of the field where you are estimating soil loss, and the LS value must be derived from Table 3.

Cropping and Management (C) Factor

C reflects the reduction in soil erosion that will result from growing a crop as compared with leaving the land fallow. The amount of reduction depends upon the type of crop grown, the cropping system, tillage practices, crop yield, and residue management. Cropping and management practices influence erosion potential by the degree to which their combinations keep the soil surface rough or covered with crop residues or vegetation. C values range from a high of 1.0 for continuous fallow (soil tilled to permit no vegetation to grow) to a low of 0.003 for excellent grass cover. By determining $R \times K \times LS$ for the field segment under examination and multiplying that figure by various C values, you can compare the soil erosion that you could expect from different cropping and management practices (without the use of soil conservation practices).

There are many possible cropping and management combinations. For example, almost any crop can be grown continuously or in rotation with other crops, and additional soil protection can be gained by seeding a cover crop in the row crop late in the season. Soils can be left rough with considerable storage capacity, or they can be smoothed by secondary tillage. Crop residues can be removed, left on the soil surface, incorporated near the soil surface, or plowed under. Even if crop residue is left on the surface, it can be chopped or allowed to remain as it was after harvest.

So that C values would more accurately reflect these and many other possible combinations according to geographical differences in climate, planting dates, and cropping systems, Illinois was divided into three sections. Figure 2 shows the three geographical divisions. By locating your county, you can determine which geographically specific table to use to find your C value. If you are in Knox County, for example, Figure 2 tells you to see Table 4.

Northern Illinois C values can be found in Table 4, those for central Illinois in Table 5, and those for southern Illinois in Table 6. If you wish to make soil erosion estimates for permanent pasture and grazed or burned woodland, use Table 7 for the appropriate value. Table 8 can be used to find C values for undisturbed forest.

Once you have identified the table to use, identify in column 1 of the table the cropping sequence being used on the field segment being evaluated. (Note that C values for double-cropping sequences also are listed in the central and southern Illinois tables.) If the rotation includes soybeans, locate the row width in column 2.

The C value can now be found in the subsequent columns depending upon the type of

*Where terraces are installed, the slope length is usually the distance from the top of the terrace ridge to the center of the next lower terrace channel. If the terraces are built on the contour and used in conjunction with contour farming or contour strip cropping, an additional P factor is used. See pages 5–6 for calculating the P factor for terraces built on contour.

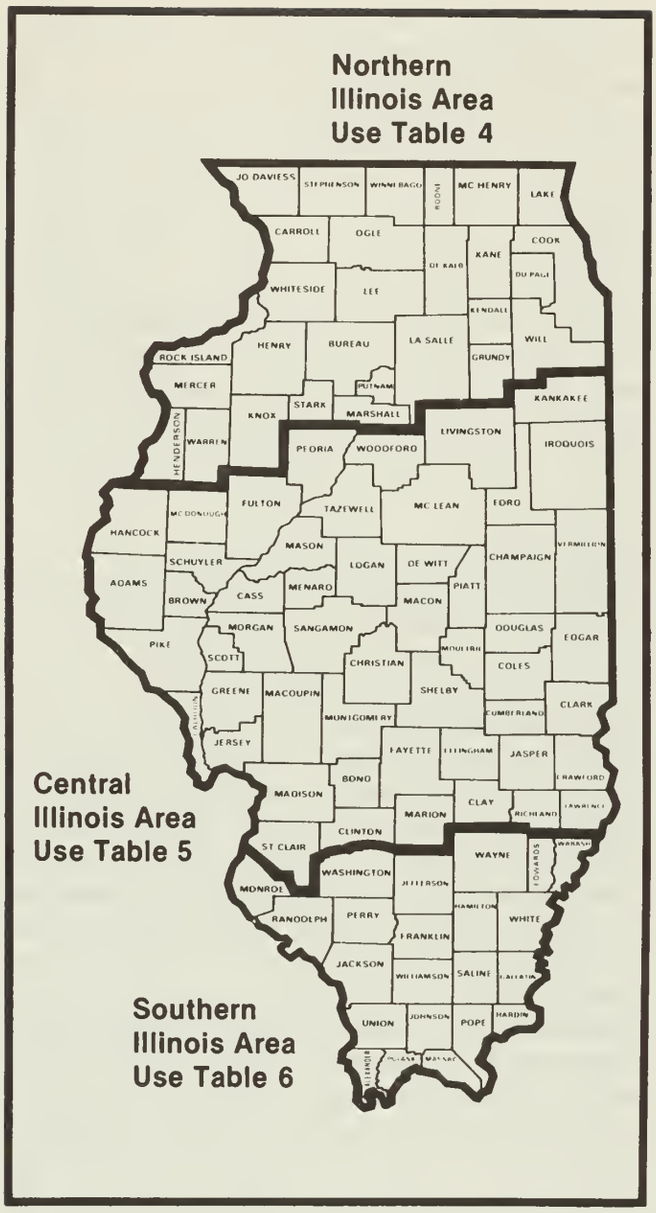


Figure 2. Cropping and management (C) factor map.

tillage that is used—conventional, reduced, or no-till. (Each table also lists C values for some more common combinations of these tillage systems. See your SCS district conservationist if you are using other combinations.) Conventional tillage includes moldboard plowing, disking, planting, and cultivating. Reduced tillage includes either a chisel plow or a disk as the primary tillage tool, followed by a field cultivator or other secondary tillage tools that leave a portion of the crop residue on the soil surface after planting. No-till involves leaving the soil surface nearly undisturbed and all crop residue on the soil surface, thus providing maximum soil erosion protection all season.

If you are using conventional tillage, you can look under either the "fall plow" or "spring plow" column to determine your C value. If you are using a reduced tillage or no-till system, however, you will first need to determine the percentage of residue cover after planting before finding your C value.

Residue soil surface cover *after* planting is important because it provides soil protection when the soil would otherwise be most vulnerable to erosion: from seedbed preparation until new crop growth provides soil cover. This time period, when the ground is exposed to the elements, is also when the most intensive rains usually occur.

There is a difference in the amount of residue cover left on the soil surface by different crops and how well this cover holds up under planting operations. For example, a good field of corn with a yield of over 100 bushels per acre will leave about 90 to 95 percent of the soil surface covered after harvest, while a good field of soybeans with a yield of 40 to 45 bushels per acre will leave about 80 to 85 percent. Because soybean residue is more fragile, additional tillage or travel over the field after harvest and during planting will cover much more of the soybean residue than the corn residue.

To estimate the percentage of soil surface still covered by residue after planting, you can use the point and line method. You can make your own line, use any line, rope, or measuring tape that has 100 evenly spaced points, or buy a commercially made line. To make your own line, take a piece of 1/8- or 3/16-inch nylon rope, about 70 feet long, and tie 100 knots, 6 inches apart. After the knots are tied, the rope should shorten to just about 50 feet long.

Next, make a short loop at each end of the rope and tie the ends to stakes. Then stretch the line across the crop rows at approximately 45 degrees. The angle or position of the rope should be adjusted so that both stakes are placed on a row (see Figure 3, insert).

Standing over the rope and looking straight down at the knots, count the knots that intersect a piece of crop residue (Figure 3). Ignore small pieces of residue that will decay quickly or that are too small to intersect a raindrop. Even though stones will intersect raindrops, do not count them. The number of knots that intersect a piece of crop residue equals the percentage of soil surface covered. For example, if 75 knots intersect residue, then the surface cover is 75 percent. Make a count on three other randomly

selected areas in the field segment, and take an average of the four areas.

Once you have determined the percentage of soil surface covered, you can directly find the appropriate C value in the table if you are planting continuous corn or soybeans. Round percentages to the nearest number of the column. If you are rotating crops, you will need to estimate the *average* percentage of soil cover to determine which column to use. For example, if residue covered 20 percent of the soil surface after corn was planted under a reduced tillage system and 40 percent after soybeans were planted, you would find your C value in the 30 percent column ($20 + 40 \div 2 = 30$).

Please note that certain assumptions have been made about the level of management, the rotation sequence, and the tillage methods in order to determine C values. These assumptions are detailed in the footnotes to each table. Therefore, you should take special care to read the footnotes to make sure your practices and the table's assumptions are the same. Each footnote will give you instructions about what to do if your practices are not the same as the assumptions. Usually the footnote will instruct you to multiply the value in the table by another number to arrive at a C value that reflects your individual practices. For example, as the general note to Tables 4, 5, and 6 explains, all C values in the tables assume that the field segment being evaluated is under a high level of management with corn yields exceeding 100 bushels per acre; soybeans, 40 bushels; wheat, 45 bushels; oats, 60 bushels; and hay, 3 tons per acre. The note instructs you to multiply the C value in the table by 1.2 if the section is under a medium level of management with lower yields.

Also please note that it is impossible to predict all the individual variations in cropping and management practices. If you cannot find your exact practices in the appropriate table, consult with your SCS district conservationist or county Extension adviser about how you might arrive at a reasonable value.

Conservation Practices (P) Factor

P represents the reduction in soil erosion resulting from the use of conservation practices that change the flow of runoff water, such as contour farming, contour strip cropping, and terracing. $R \times K \times LS \times C \times P$ thus equals the soil erosion for a field segment with conservation practices applied.

The P factors for contour farming and contour strip cropping are shown in Table 9. Because contouring loses its effectiveness as slope length increases, the table also gives the maximum slope length on which contour farming is effective. Remember that contouring benefits are obtained only when the field is relatively free from gullies and depressions other than grassed waterways.

When terraces are built on the contour and used in combination with contour farming or

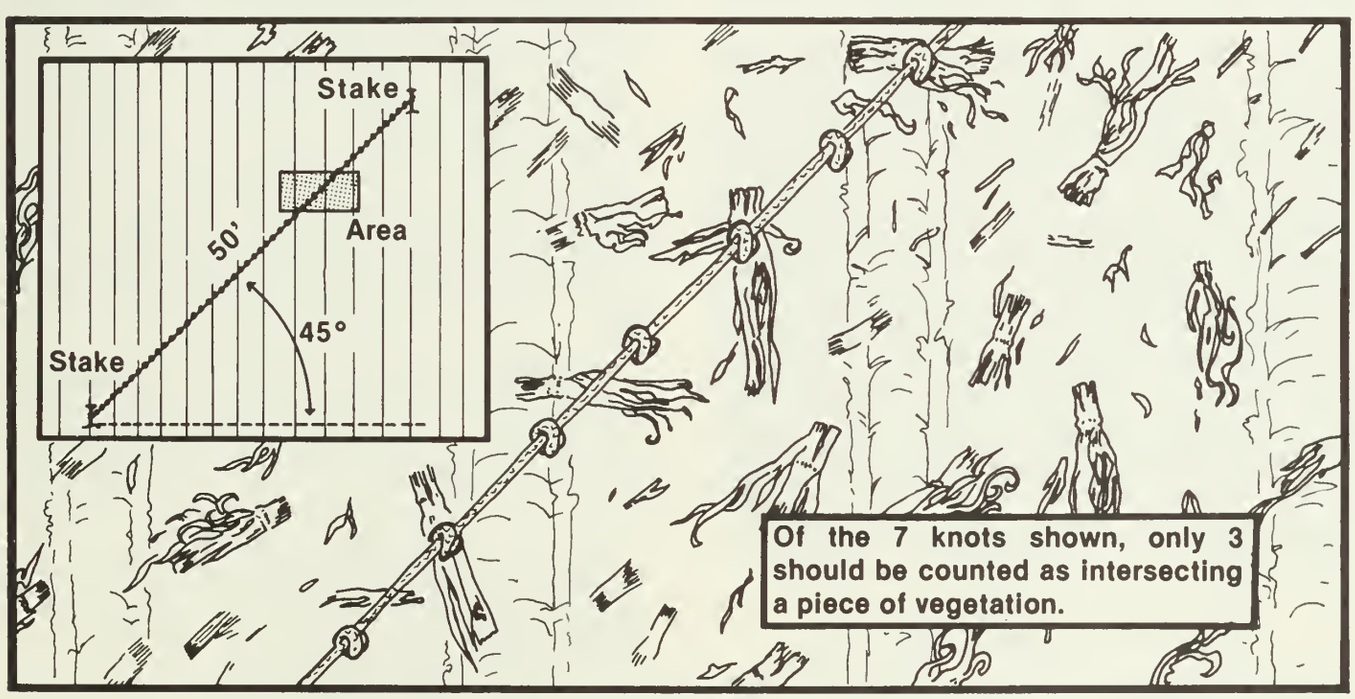


Figure 3. Overview (insert) and closeup of the point-and-line method of determining percentage of surface residue covering.

contour strip cropping, you must use Tables 9 and 10 in conjunction to determine your P value. (P values are not used when terraces are not built on the contour. Parallel terrace systems may not meet the contour criteria.) After choosing values from both tables, you multiply these values to arrive at the correct P value.

For example, assume that you have installed level ridge tile outlet terraces on the contour, 120 feet apart, on a 5 percent slope, and contour farmed. From Table 9 you would determine that the contour factor is 0.5, while from Table 10 you would determine that the terrace factor is 0.6. You would then multiply the two factors to arrive at a conservation practices (P) value of 0.3 ($0.5 \times 0.6 = 0.3$). This is the value that you would insert into the USLE to determine the annual soil erosion rate.

Research has shown that trapped sediment accumulates in the terrace channel and ridge area to such an extent that this portion of the land does not deteriorate significantly. The P factor is proportioned to give credit where the soil resource is maintained, that is, the factor gets larger as the terrace interval gets wider, thus giving less credit. Tile outlet terraces are more effective in trapping sediment than open outlets, and trapping efficiency goes down as terrace grade increases.

Using the USLE

Working through Some Examples

How the land's physical features, the climate, your crops, and your soil conservation practices affect soil losses has been briefly discussed. The USLE enables you to estimate your average annual soil erosion losses for a cropping and management system by multiplying all the values assigned to factors that affect erosion. Two examples of how to use the equation follow.

Example 1. Our first example assumes a farm in Pike County, Illinois, with Fayette silt-loam soil. The field segment is on a 5 percent slope that is 300 feet long. The R value for Pike County is 200 (Figure 1); the K value for Fayette silt-loam is 0.37 (Table 1); the LS value is 0.93 (Table 3). The amount of soil lost annually under fallow would thus be:

$$\underset{R}{200} \times \underset{K}{0.37} \times \underset{LS}{0.93} = \underset{A}{68.8 \text{ tons}}$$

Figure 2 indicates that the C values for Pike County can be found in Table 5. The crop rotation used is corn, soybeans, wheat, and a clover catch crop. The field is conventionally tilled and spring plowed. Residues are left on the soil surface, and soybeans are drilled in 10-inch rows. The field segment is under a high level of management. According to Table 5, therefore, the C factor is 0.22. (Note that footnote *f* indicates to use the same C factor with or without legume seeding.) We can now determine the annual soil erosion loss that would occur if the farm did not use conservation practices (P value):

$$R \times K \times LS = 68.8 \times \underset{C}{0.22} = \underset{A}{15 \text{ tons}}$$

If the field is contour farmed, a P factor of 0.5 (Table 9) would be multiplied by the above value to determine *A*. As a result, the amount of soil lost annually would be:

$$R \times K \times LS \times C = 15 \times \underset{P}{0.5} = \underset{A}{7.6 \text{ tons}}$$

Because the soil loss tolerance level is 5 tons per acre for a Fayette silt-loam soil that has more than three inches of topsoil (Table 1), 7.6 tons per acre is well above the limit.

If the tillage system were changed to a reduced tillage system that used primary tillage and two secondary operations prior to planting, *A* would be significantly lower. Let us assume that this reduced tillage system resulted in an average percentage of soil cover of 40 percent (the average of the percent residue cover after corn was planted and after soybeans were planted). The C value, according to Table 5, would change to 0.12. As a result, *A* would reduce to:

$$\underset{R}{200} \times \underset{K}{0.37} \times \underset{LS}{0.93} \times \underset{C}{0.12} \times \underset{P}{0.5} = \underset{A}{4.1 \text{ tons}}$$

Thus, this particular cropping and management system would bring the average annual soil erosion below the 5-ton soil erosion limit. Other conservation options include terracing the field, changing the crop rotation, using zero till, or using a combination of practices.

Example 2. As a second example, let us assume a farm in Perry County with a field segment of Ava silt loam soil and a 5 percent slope that is 200 feet long. The R value for Perry County is 220 (Figure 1); the K value for silt loam is 0.43 (Table 1); the LS value is 0.76 (Table 3). The T value for this soil is 4 tons per acre (Table 1). The calculation below gives the annual soil loss under fallow:

$$\underset{R}{220} \times \underset{K}{0.43} \times \underset{LS}{0.76} = \underset{A}{71.9 \text{ tons}}$$

Figure 2 indicates that the C value for Perry County can be found in Table 6. On this segment, a corn and soybean rotation is grown conventionally tilled and spring plowed. Both crops are planted in 30-inch rows. The field segment is under a medium level of management with corn yields of 75 bushels per acre and soybean yields of 33 bushels per acre.

According to the spring plow column in Table 6, therefore, the C value is 0.31. However, the general note to the entire table indicates that the value in the table must be multiplied by 1.2 when the field is under a medium level of management. The C value for the field segment in this example is thus actually 0.37 (0.31 × 1.2). As a result, 26.6 tons of soil would be lost annually without any conservation practices:

$$R \times K \times LS = 71.9 \times \overset{C}{0.37} = \overset{A}{26.6} \text{ tons}$$

If the field is contour plowed, a P factor of 0.5 (Table 9) would be multiplied by the above value to determine *A* under conservation practices:

$$26.6 \times \overset{P}{0.5} = \overset{A}{13.3} \text{ tons}$$

This value is substantially above the T value of 4. The farmer would thus probably have to change several practices to lower the value.

Perhaps the operator would consider changing to a no-till system. But would such a change lower the soil loss to the established T value? A quick answer can be obtained by looking at the C value for a no-till corn-soybean rotation. Assuming that such a no-till rotation would achieve an average of 50 percent soil cover after planting, the C value would be 0.11. However, if the operator still plans a medium level of management, the C value actually would be 0.13 (0.11 × 1.2). As the calculation below indicates, a no-till system would substantially reduce the field's annual soil loss, nearly meeting the T value and long-term state goals:

$$\overset{R}{220} \times \overset{K}{0.43} \times \overset{LS}{0.76} \times \overset{C}{0.13} \times \overset{P}{0.5} = \overset{A}{4.6} \text{ tons}$$

Increasing the crop yield to meet the high level of management would lower the soil loss to below the T value:

$$\overset{R}{220} \times \overset{K}{0.43} \times \overset{LS}{0.76} \times \overset{C}{0.11} \times \overset{P}{0.5} = \overset{A}{3.95} \text{ tons}$$

Of course, other options exist. The operator could change the rotation (corn and double-crop, no-till wheat and soybeans, for example, would result in a C value of 0.08), use a combination tillage system, terrace on the contour, or plant narrow-row soybeans, to name a few.

As both these examples suggest, the use of the USLE is not just limited to determining the nearness of your soil loss to the T value. The USLE also can be used to evaluate the effects of your management decisions on the soil erosion on your farm.

Solving the USLE for C

Let us assume that you have determined your annual rate of soil loss using the USLE and found that the rate is above the T value for your soil type. If you do not have the option of changing or adding conservation practices (P value), you will want to know what particular cropping and management practices (C value) would lower your annual rate to or below the T value. To solve the USLE for *C*, use the following formula:

$$\frac{T}{R \times K \times LS \times P} = C$$

Using the information from Example 1, we could solve for an acceptable C factor:

$$\frac{5}{200 \times 0.37 \times 0.93 \times 0.5} = \frac{5}{34.4} = 0.14$$

After solving this equation, we would know that any crop rotation and tillage system in Table 5 with a C factor of 0.14 or less would help us meet the annual soil erosion goal in that example of 5 tons per acre.

Getting Help

The Soil Conservation Service (SCS) district conservationist located in each of the soil and water conservation district offices has for many years used this method of estimating soil erosion losses. Therefore, you may wish to have an SCS representative assist you in determining the appropriate factors to insert into the USLE. The district conservationist can also help you by recommending alternative soil erosion control practices. In addition, the SCS conservationist can supply you with C values for combinations of tillage systems for a rotation.

Table 1. Soil Erodibility (K) and Tolerance (T) Values for Specific Illinois Soils

Soil type	K factor	T factor[a]	Soil type	K factor	T factor[a]	Soil type	K factor	T factor[a]
Ade 98	0.17	5-5	Brooklyn 136	0.37	4	Drummer 152	0.28	5
Alford 308	.37	5-4	Bryce 235	.28	3	Drury 75	.37	5
Allison 306	.28	5	Burkhardt 961	.20	3-2	Dubuque 29	.37	4-3
Alvin 131	.24	5-4	Burnside 427	.37	4	Dunbarton 505	.37	2-1
Ambraw 302	.28	5	Cairo 590	.28	4	Du Page 321	.28	5
Andres 293	.28	5-4	Calamine 746	.28	5	Dupo 180	.37	5
Aptakisic 365	.37	5-4	Calco 400	.28	5	Durand 416	.32	5-4
Arenzville 78	.37	5	Camden 134	.37	5-4	Ebbert 48	.37	5
Argyle 227	.32	4-3	Canisteo 347	.28	5	Edgington 272	.32	5
Armiesburg 597	.28	5	Cape 422	.32	3	Edinburg 249	.37	4
Ashdale 411	.32	5-4	Carmi 286	.20	4-3	Edmund 769	.32	2-1
Ashkum 232	.28	5	Casco 323	.32	3-2	Elburn 198	.28	5
Assumption 259	.32	4-3	Catlin 171	.32	5-4	Elco 119	.37	4-3
Atkinson 661	.28	4-3	Channahon 315	.37	2-1	El Dara 264	.24	5-4
Atlas 7	.43	3-2	Chatsworth 241	.43	3-2	Eleroy 547	.37	4-3
Atterberry 61	.32	5-4	Chauncey 287	.37	3	Elkhart 567	.32	5-4
Ava 14	.43	4-3	Chelsea 779	.17	5	Elliott 146	.28	4-3
Backbone 768	.24	4-3	Chute 282	.15	5	Ellison 137	.37	4-3
Banlic 787	.43	4	Cisne 2	.37	3	Elsah 475	.37	3
Barrington 443	.32	5-4	Clarence 147	.37	3-2	Emma 469	.37	5-4
Batavia 105	.32	5-4	Clarksdale 257	.37	5-4	Faxon 516	.28	4
Baxter 599	.32	4-3	Clarksville 471	.24	2-1	Fayette 280	.37	5-4
Baylis 472	.37	4-3	Clinton 18	.37	5-4	Fieldon 380	.28	5
Beardstown 188	.32	5-4	Coatsburg 660	.37	3-2	Fincastle 496	.37	5-4
Beasley 691	.43	3	Coffeen 428	.32	5	Fishhook 6	.43	3-2
Beaucoup 70	.32	5	Colo 402	.28	5	Flagg 419	.37	5-4
Bedford 598	.43	4-3	Colp 122	.43	3-2	Flagler 783	.20	4-3
Beecher 298	.37	3	Comfrey 776	.28	5	Flanagan 154	.28	5
Belknap 382	.37	5	Corwin 495	.32	5	Fox 327	.37	4-3
Berks 955 & 986[b]	.28	3-2	Cowden 112	.37	3	Frankfort 320	.37	3-2
Billett 332	.20	5-4	Coyne 764	.20	5-4	Friesland 781	.20	5-4
Birds 334	.43	5	Creal 337	.37	5-4	Frondorf 786	.32	3-2
Birkbeck 233	.37	5-4	Dakota 379	.28	4-3	Gale 413	.37	4-3
Blackoar 603	.28	5	Dana 56	.32	5-4	Genesee 431	.37	5
Blair 5	.43	3-2	Darmstadt 620	.43	3	Gilford 201	.20	5
Bloomfield 53	.15	5	Darroch 740	.28	5	Ginat 460	.43	4
Blount 23	.43	3-2	Darwin 71	.28	3	Gorham 162	.32	5
Bluford 13	.43	3-2	Del Rey 192	.43	3-2	Gosport 551	.43	3-2
Bodine 471	.24	2-1	Denny 45	.37	3	Goss 606	.24	2-1
Bold 35	.43	5-4	Denrock 262	.37	3-2	Granby 513	.17	5
Bonfield 493	.24	3	Derinda 417	.43	3-2	Grantsburg 301	.43	4-3
Bonnie 108	.43	5	Dickinson 87	.20	4-3	Grays 698	.32	5-4
Booker 457	.37	5	Disco 266	.20	4	Grellton 780	.24	5-4
Boone 397	.15	4	Dodge 24	.37	4-3	Griswold 363	.32	5-4
Bowdre 589	.28	4	Dodgeville 40	.32	4-3	Hamburg 30	.43	5
Bowes 792	.32	5-4	Dorchester 239	.37	5	Harco 484	.32	5
Boyer 706	.17	4-3	Douglas 128	.32	5-4	Harpster 67	.28	5
Brandon 956[b]	.37	3-2	Dowagiac 346	.28	4-3	Harrison 127	.32	5-4
Brenton 149	.28	5	Downs 386	.32	5-4	Hartsburg 244	.28	5
Broadwell 684	0.32	5-4	Dresden 325	0.28	4-3	Harvard 344	0.32	5-4

Source: *Illinois Technical Guide,* Section 2, Soil Conservation Service, Champaign, Illinois.
[a]The first number in the column applies to soils with no erosion to moderate erosion; the second number, where it appears, applies to seriously eroded land with three inches or less topsoil remaining.
[b]In complexes with other soils.

Table 1. Continued

Soil type	K factor	T factor[a]
Hayfield 771	0.32	5
Haymond 331	.37	5
Hennepin 25	.32	5-4
Herbert 62	.32	5
Herrick 46	.28	5
Hesch 390	.20	4-3
Hickory 8	.37	5-4
High Gap 556	.37	4-3
Hitt 506	.32	5-4
Homer 326	.37	4
Hononegah 354	.15	4
Hoopeston 172	.20	4
Hosmer 214	.43	4-3
Hoyleton 3	.37	3-2
Huey 120	.43	2
Huntington 600	.28	5
Huntsville 77	.28	5
Hurst 338	.43	3-2
Iona 307	.37	5-4
Ipava 43	.28	5
Iva 454	.43	4-3
Jacob 85	.28	3
Jasper 440	.28	5
Joliet 314	.28	3
Joslin 763	.32	5-4
Joy 275	.28	5-4
Jules 28	.37	5
Juneau 782	.37	5
Kane 343	.28	4
Kankakee 494	.20	4
Karnak 426	.32	3
Keller 470	.37	3-2
Keltner 546	.32	4-3
Kendall 242	.37	5-4
Keomah 17	.37	5
Kernan 554	.37	4-3
Kidder 361	.32	5-4
Knight 191	.32	4
La Hogue 102	.28	5
Lamont 175	.24	5-4
Landes 304	.20	5
La Rose 60	.32	5-4
Lawler 647	.28	4
Lawndale 683	.32	5
Lawson 451	.28	5
Lax 628	.43	4-3
Lisbon 59	.28	5-4
Littleton 81	.28	5
Lomax 265	.28	5
Loran 572	0.28	4-3
Lorenzo 318	0.28	3-2
Lukin 167	.37	4-3
Marissa 176	.37	4
Markham 531	.37	3-2
Markland 467	.43	3-2
Marseilles 549	.37	4-3
Marshan 772	.28	4
Martinsville 570	.37	5-4
Martinton 189	.32	4-3
Massbach 753	.32	4-3
Matherton 342	.20	4-3
Maumee 89	.17	5
McFain 248	.28	4
McGary 173	.43	3-2
McHenry 310	.37	5-4
Medway 682	.32	5
Metea 205	.17	5-4
Miami 27	.37	5-4
Middletown 685	.37	5-4
Milford 69	.28	5
Millbrook 219	.32	5-4
Millington 82	.28	5
Millsdale 317	.32	4
Milroy 187	.24	4
Mokena 295	.28	4-3
Mona 448	.28	4-3
Monee 229	.37	3-2
Montgomery 465	.37	5
Montmorenci 57	.32	5-4
Morley 194	.43	3-2
Morocco 501	.17	5
Mt. Carroll 268	.32	5-4
Mundelein 442	.28	5-4
Muren 453	.37	5-4
Muscatine 41	.28	5
Muskingum 425	.28	3-2
Myrtle 414	.32	5-4
Nappanee 228	.43	3-2
Nasset 731	.32	4-3
Negley 585	.32	3-2
Neotoma 976 & 977[b]	.20	3-2
Newberry 217	.37	3
New Glarus 928 & 561[b]	.37	4-3
Niota 261	.37	3
Oakville 741	0.15	5
Ockley 387	0.37	5-4
Oconee 113	.37	3-2
Octagon 656	.32	5-4
Odell 490	.32	5-4
Ogle 412	.28	5-4
Okaw 84	.43	3-2
Onarga 150	.20	4-3
Oneco 752	.32	5-4
Orio 200	.28	4
Orion 415	.28	5
Otter 76	.28	5
Palsgrove 429	.32	4-3
Pana 256	.32	4-3
Papineau 42	.20	4
Parkville 619	.28	5
Parr 221	.32	5-4
Patton 142	.28	5
Pecatonica 21	.37	5-4
Pella 153	.28	5
Peotone 330	.28	5
Petrolia 288	.32	4
Piasa 474	.37	3
Pike 583	.37	5-4
Pillot 159	.32	4-3
Piopolis 420	.43	4
Plainfield 54	.17	5
Plano 199	.32	5-4
Plattville 240	.32	5-4
Port Byron 277	.32	5-4
Proctor 148	.32	5-4
Racoon 109	.43	3
Raddle 430	.32	5-4
Radford 74	.28	5
Rantoul 238	.28	3
Raub 481	.28	5
Reddick 594	.28	5
Reesville 723	.37	5
Richview 4	.32	5-4
Ridgeville 151	.20	4
Ridott 743	.32	4-3
Riley 452	.28	4
Ringwood 297	.28	5-4
Ripon 324	.32	4-3
Ritchey 311	.37	2-1
Robbs 335	.43	4-3
Roby 184	.24	4
Rockton 503	.28	4-3
Rodman 93	.20	3-2
Romeo 316	0.37	1

[a]The first number in the column applies to soils with no erosion to moderate erosion; the second number, where it appears, applies to seriously eroded land with three inches or less topsoil remaining.
[b]In complexes with other soils.

Table 1. Continued

Soil type	K factor	T factor[a]	Soil type	K factor	T factor[a]	Soil type	K factor	T factor[a]
Ross 73	0.32	5	Strawn 224	0.37	4-3	Washtenaw 296	0.37	5
Rowe 230	.28	5	Streator 435	.28	3	Watseka 49	.17	2
Rozetta 279	.37	5-4	Stronghurst 278	.37	5-4	Wauconda 697	.32	4-3
Ruark 178	.24	4	Sunbury 234	.32	5-4	Waukee 727	.24	4-3
Rush 791	.37	5-4	Swygert 91	.43	3-2	Waukegan 564	.32	4-3
Rushville 16	.43	3	Sylvan 19	.37	5-4	Waupecan 369	.32	4-3
Russell 322	.37	5-4	Symerton 294	.32	5-4	Wea 398	.32	5-4
Rutland 375	.32	5-4	Tallula 34	.32	5-4	Weinbach 461	.43	4-3
Sabina 236	.37	5-4	Tama 36	.32	5-4	Weir 165	.43	4
Sable 68	.28	5	Tamalco 581	.43	3-2	Wellston 339	.37	4-3
Saffell 956[b]	.20	4	Tell 565	.37	4-3	Wenona 388	.32	4-3
Sarpy 92	.15	5	Terril 587	.24	5	Wesley 141	.24	3-2
Saude 774	.28	4-3	Thebes 212	.37	4-3	Westland 300	.28	5
Sawmill 107	.28	5	Thorp 206	.37	4	Westmore 940[b]	.37	4
Saybrook 145	.32	5-4	Tice 284	.32	4	Westville 22	.37	5-4
Saylesville 370	.37	3-2	Timula 271	.37	5-4	Whalan 509	.32	4-3
Schapville 418	.32	3-2	Titus 404	.32	4	Wheeling 463	.32	4-3
Sciotoville 462	.37	4-3	Toronto 353	.32	5-4	Whitson 116	.43	4
Seaton 274	.37	5-4	Traer 633	.37	5	Will 329	.28	4
Selma 125	.28	5	Trempealeau 765	.28	3	Wingate 348	.32	5-4
Sexton 208	.43	4	Troxel 197	.28	5	Winnebago 728	.32	5-4
Shadeland 555	.37	4	Uniontown 482	.37	4-3	Woodbine 410	.37	4-3
Sharon 72	.37	5	Ursa 605	.37	4-3	Worthen 37	.32	5-4
Shiloh 138	.28	3	Varna 223	.32	4-3	Wynoose 12	.43	3
Shoals 424	.37	5	Velma 250	.32	4-3	Xenia 291	.37	5-4
Shullsburg 745	.32	4-3	Virden 50	.28	5	Zanesville 340	.43	3-2
Sidell 55	.32	5-4	Virgil 104	.32	5-4	Zipp 524	.28	5
Sogn 504	.28	1	Wabash 83	.28	5	Zurich 696	.37	5-4
Sparta 88	.17	5	Wagner 26	.28	3	Zwingle 576	0.43	3-2
St. Charles 243	.37	5-4	Wakeland 333	.37	5			
St. Clair 560	.37	3-2	Walshville 584	.43	3-2			
Starks 132	.37	5	Ware 456	.32	4			
Stockland 155	.20	2-1	Warsaw 290	.28	4-3			
Stonelick 665	.24	5	Wartrace 215	0.37	5-4			
Stoy 164	0.43	4-3						

[a]The first number in the column applies to soils with no erosion to moderate erosion; the second number, where it appears, applies to seriously eroded land with three inches or less topsoil remaining.
[b]In complexes with other soils.

Table 2. Soil Erodibility (K) Values for Certain General Soil Types

Soil type	K value	Soil loss tolerance[a] (tons/acre/year)
Dark and moderately dark soil somewhat wet and with good permeability (for example, Muscatine, Ipava, Flanagan, and Herrick)	0.28	5
Dark and moderately dark prairie soil with good permeability (for example, Catlin, Harrison, Proctor, Saybrook, and Tama)	.32	5–4
Dark and light prairie soil with restricted permeability (for example, Cisne, Cowden, and Clarence)	.37	3–2
Dark prairie soil with very restricted permeability (for example, Swygert)	.43	3–2
Light-colored forest soil with good permeability (for example, Alford, Birkbeck, Clinton, and Fayette)	.37	5–4
Light-colored forest soil with restricted permeability (for example, Ava, Blount, Grantsburg, Hosmer, and Wynoose)	.43	4–3
Sandy loam soil (for example, Dickinson, Onarga, and Ridgeville)	.20	4–3
Loose sand (for example, Ade, Plainfield, and Sparta)	0.17	5

Note: See Table 1 for a more complete listing of K values for specific soils.

[a]The first number represents the soil loss tolerance for soils with less than severe soil erosion. The second number, where it appears, represents the soil loss tolerance for soils with severe soil erosion and strong evidence of subsoil mixing with the topsoil.

Table 3. Slope Length and Steepness (LS) Values for Specific Combinations of Length and Steepness

Slope steepness (percent)	Slope length (feet)									
	25	50	75	100	150	200	300	400	500	600
1	0.01	0.11	0.12	0.13	0.15	0.16	0.18	0.19	0.20	0.21
2	0.13	0.16	0.19	0.20	0.23	0.25	0.28	0.31	0.33	0.34
3	0.19	0.23	0.26	0.29	0.33	0.35	0.40	0.44	0.47	0.49
4	0.23	0.30	0.36	0.40	0.47	0.53	0.62	0.70	0.76	0.82
5	0.27	0.38	0.46	0.54	0.66	0.76	0.93	1.07	1.20	1.31
6	0.34	0.48	0.58	0.67	0.82	0.95	1.17	1.35	1.50	1.65
8	0.50	0.70	0.86	0.99	1.21	1.41	1.72	1.98	2.22	2.43
10	0.69	0.97	1.19	1.37	1.68	1.94	2.37	2.74	3.06	3.36
12	0.90	1.28	1.56	1.80	2.21	2.55	3.13	3.61	4.04	4.42
14	1.15	1.62	1.99	2.30	2.81	3.25	3.98	4.59	5.13	5.62
16	1.42	2.01	2.46	2.84	3.48	4.01	4.92	5.68	6.35	6.95
18	1.72	2.43	2.97	3.43	4.21	4.86	5.95	6.87	7.68	8.41
20	2.04	2.88	3.53	4.08	5.00	5.77	7.07	8.16	9.12	10.0

Table 4. Cropping and Management (C) Values for Northern Illinois

Crop sequence[a]	Soybean row width[b]	Conventional tillage[c]		Chisel, disk, or ridge[d,e]				All corn and soybeans planted no-till[e]							
		Fall plow	Spring plow	20%	30%	40%	50%	20%	30%	40%	50%	60%	70%	80%	90%
Continuous soybeans	wide	.44	.39	.36	.32	...	...	.25	.20	.16	...	...	...	...	...
	narrow	.36	.32	.31	.29	...	...	.21	.18	.15	...	...	...	...	...
Continuous corn		.34	.29	.21	.18	.15	.12	...	...	...	...	.08	.06	.04	.03
C-Sb	wide	.38	.33	.28	.24	.20	.19	...	...	.18	.14	.10	.09	...	...
	narrow	.34	.30	.27	.23	.19	.18	...	...	.17	.14	.10	.09	...	...
C-C-Sb	wide	.36	.32	.26	.22	.18	.17	...	...	...	.14	.11	.08	.07	...
	narrow	.34	.30	.25	.21	.17	.16	...	...	...	.14	.11	.08	.07	...
C-Sb-G[f]	wide	.27	.25	.18	.16	.13	.12	...	...	.10	.07	.05	.04	...	...
	narrow	.25	.23	.17	.15	.12	.11	...	...	.09	.07	.05	.04	...	...
C-C-G-M[g,h]		.14	.12	.10	.09	.08	.07	...	...	...	...	.04	.03	.02	.02
C-Sb-G-M[g,h]	wide	.15	.13	.10	.09	.08	.08	...	...	.05	.04	.03	.03	...	...
	narrow	.13	.12	.10	.09	.08	.07	...	...	.05	.04	.03	.03	...	...
C-Sb-M-M[g,h]	wide	.12	.10	.08	.07	.06	.06	...	...	.03	.02	.02	.01	...	...
	narrow	.11	.08	.07	.07	.06	.06	...	...	.03	.02	.02	.01	...	...
C-G-M[g,h]		.09	.07	.07	.07	.06	.06	...	...	...	...	.03	.02	.02	.01
C-M-M-M[g,h]		.05	.04	...	...	...	...	...	...	...	...	.01	.008	.006	.006

Combination Tillage Systems

Crop sequence[a]	*Tillage systems used for sequence*	*Soybean row width*[b]	*Percent soil cover after planting each crop*		
			20%	*30%*	*40%*
C-Sb	Corn after soybeans, no-till; soybeans after corn, fall chisel, spring secondary tillage	wide	.23	.19	.15
		narrow	.21	.18	.14

Source: C values for this table were calculated from the Soil Conservation Service's *Illinois Technical Guide*, Section I-C (EI Curve 14).

NOTE: Values in this table are based on high level management with yields equal to or exceeding the following: corn, 100 bushels per acre; soybeans, 40 bushels per acre; wheat, 45 bushels per acre; oats, 60 bushels per acre; meadow, 3 tons per acre. For medium level management, multiply values by 1.2.

[a]In this column, *C* = corn, *Sb* = soybeans, *G* = small grain, *M* = meadow, and *W* = wheat.

[b]Use the wide-row values for soybean rows wider than 20 inches. Use the narrow-row values for soybean rows planted 20 inches or less, including drilled.

[c]Where corn residue is removed for silage or other purposes, multiply the C value by 1.2 for intensive rotations such as corn and soybeans or corn, corn, and soybeans. Do not multiply the C value by any number for the less intensive rotations, including meadow crops, where crop residue is removed.

[d]Values for chisel and disk systems are for ~~all~~ primary tillage and two secondary tillage operations prior to planting. For primary tillage in the spring or ridge planting up and down hill, multiply the appropriate C values by 0.9 in northern Illinois, by 0.8 in central Illinois, and by 0.7 in southern Illinois. For ridge planting on the contour, multiply the appropriate C value by 0.7 in northern Illinois, by 0.6 in central Illinois, and by 0.5 in southern Illinois. Ridge planting is applicable only for row crops following row crops.

[e]The percent figures represent the percentage of the soil surface covered after planting. The percent figure for a rotation is equal to the average cover for the crop sequence. For example, if, in a corn-soybean rotation, residue covered 20 percent of the soil surface after corn was planted and 60 percent after soybeans were planted, the average cover would be 40 percent, and you would find your C value in the 40 percent column.

[f]The same C values are applicable for small grain both with and without a catch crop.

[g]Chisel and disk C values are calculated for spring-plow, conventional tillage when corn follows meadow.

[h]Values are based on a sod or grass legume mixture consisting of at least 50 percent grass and established at least one full growing season. If meadow is primarily legume, multiply the appropriate C value by 1.2.

Table 5. Cropping and Management (C) Values for Central Illinois

Crop sequence[a]	Soybean row width[b]	Conventional tillage[c]		Chisel, disk, or ridge[d,e]				All corn and soybeans planted no-till[e]							
		Fall plow	Spring plow	20%	30%	40%	50%	20%	30%	40%	50%	60%	70%	80%	90%
Continuous soybeans	wide	.48	.41	.37	.35	...	...	.26	.20	.16	...	...	...	...	...
	narrow	.40	.30	.31	.30	...	...	.20	.16	.13	...	...	...	...	...
Continuous corn		.36	.29	.21	.18	.15	.12	...	...	...	...	.09	.06	.05	.03
C-Sb	wide	.41	.35	.28	.24	.20	.19	...	...	.18	.13	.10	.09	...	...
	narrow	.36	.31	.27	.23	.19	.18	...	...	.17	.13	.09	.09	...	...
C-C-Sb	wide	.39	.33	.26	.22	.18	.16	...	...	...	.15	.11	.08	.07	...
	narrow	.36	.30	.25	.21	.18	.16	...	...	...	.14	.10	.08	.07	...
C-C-Sb-G[f]	wide	.32	.26	.19	.16	.13	.11	...	...	...	.09	.07	.05	.04	...
	narrow	.29	.24	.18	.16	.13	.11	...	...	...	.09	.06	.05	.04	...
C-Sb-G[f]	wide	.30	.25	.18	.15	.13	.11	...	...	.09	.07	.05	.04	...	...
	narrow	.27	.22	.17	.15	.12	.10	...	...	.09	.06	.05	.03	...	...
C-Sb-G-M[g,h]	wide	.17	.13	.10	.09	.08	.08	...	...	.05	.04	.03	.02	...	...
	narrow	.14	.12	.10	.09	.08	.08	...	...	.05	.04	.03	.02	...	...
C-Sb-M[g,h]	wide	.19	.15	.11	.10	.09	.08	...	...	.04	.03	.02	.02	...	...
	narrow	.16	.13	.10	.09	.09	.08	...	...	.03	.03	.02	.02	...	...
C-C-C-M-M-M[g,h]		.10	.08	.06	.05	.05	.05	...	...	...	.01	.01	.01	...	...
C-M-M-M[g,h]		.05	.04	...	...	...	...	...	...	...	...	.008	.008	.005	.005

Combination Tillage Systems

Crop sequence[a]	*Tillage systems used for sequence*	*Soybean row width[b]*	*Percent soil cover after planting each crop*		
			20%	*30%*	*40%*
C-Sb	Corn after soybeans, no-till; soybeans after corn, fall chisel, spring secondary tillage	wide	.22	.18	.14
		narrow	.21	.17	.14
C-C-Sb	Corn after soybeans, no-till; corn after corn, fall chisel, spring secondary tillage; soybeans after corn, fall chisel, spring secondary tillage	wide	.22	.18	.14
		narrow	.21	.17	.14

Double-Cropping Systems

Crop sequence[a]	*Tillage systems used for double-cropping sequence*	*C value*
C-W/Sb	Corn, conventional tillage, fall plow; disk for wheat and soybeans	.26
C-W/Sb	Corn, fall chisel, spring secondary tillage, 30 percent soil cover after planting; disk for wheat and soybeans	.20
C-W/Sb	Same as above except no-till for soybeans	.19
C-W/Sb	Corn, no-till; wheat, disk; soybeans, no-till	.11
C-W/Sb	No-till for corn, wheat, and soybeans	.09

Source: C values for this table were calculated from the Soil Conservation Service's *Illinois Technical Guide*, Section I-C (EI Curve 16).

NOTE: The footnotes for Table 5 are the same as for Table 4. Please be sure to read all footnotes because values in this table are based upon assumptions detailed in the footnotes and your practices could be different from these assumptions.

NOTE: Values in this table are based on high level management with yields equal to or exceeding the following: corn, 100 bushels per acre; soybeans, 40 bushels per acre; wheat, 45 bushels per acre; oats, 60 bushels per acre; meadow, 3 tons per acre. For medium level management, multiply values by 1.2.

Table 6. Cropping and Management (C) Values for Southern Illinois

Crop sequence[a]	Soybean row width[b]	Conventional tillage[c]		Chisel, disk, or ridge[d,e]				All corn and soybeans planted no-till[e]							
		Fall plow	Spring plow	20%	30%	40%	50%	20%	30%	40%	50%	60%	70%	80%	90%
Continuous corn		.38	.25	.20	.18	.15	.13	...	...	...	...	.07	.05	.04	.03
Continuous soybeans	wide	.48	.37	.37	.36	...	...	.22	.17	.13	...	...	...	...	...
	narrow	.42	.29	.34	.33	...	...	.19	.14	.10	...	...	...	...	...
C-Sb	wide	.42	.31	.27	.24	.21	.20	...	...	.14	.11	.08	...	...	...
	narrow	.39	.28	.26	.24	.20	.19	...	...	.14	.11	.08	...	...	...
C-Sb-G[f]	wide	.32	.24	.18	.15	.14	...	...	...	.08	.07	.05	...	...	...
	narrow	.30	.22	.17	.15	.14	...	...	...	.08	.07	.05	...	...	...
C-Sb-G-M[g,h]	wide	.17	.13	.10	.09	.09	.08	...	...	...	:05	.04	.03	.03	...
	narrow	.16	.12	.10	.09	.09	.08	...	...	...	.05	.04	.03	.03	...
C-C-Sb	wide	.40	.29	.26	.23	.20	.19	...	...	.12	.09	.07	.06	...	...
	narrow	.38	.27	.25	.22	.19	.19	...	...	.12	.09	.07	.06	...	...
C-C-M[g,h]		.17	.11	.10	.09	.08	.08	...	...	...	.03	.02	.02	.01	...
C-C-M-M-M[g,h]		.10	.06	.06	.06	.05	.05	...	...	...	.02	.02	.01	.01	...
C-M-M-M[g,h]		.04	.03	...	...	...	...	...	...	...	.01	.007	.005	.005	...

Combination Tillage Systems

Crop sequence[a]	*Tillage systems used for sequence*	*Soybean row width[b]*	*Percent soil cover after planting each crop*		
			20%	*30%*	*40%*
C-Sb	Corn after soybeans, no-till; soybeans after corn, fall chisel, spring secondary tillage	wide	.20	.16	.13
		narrow	.18	.15	.13
C-C-Sb	Corn after soybeans, no-till; corn after corn, fall chisel, spring secondary tillage; soybeans after corn, fall chisel, spring secondary tillage	wide	.20	.17	.14
		narrow	.19	.16	.13

Double-Cropping Systems

Crop sequence[a]	*Tillage systems used for double-cropping sequence*	*C value*
C-W/Sb	Corn, conventional tillage, spring plow; disk for wheat and soybeans	.21
C-W/Sb	Same as above except no-till for soybeans	.19
C-W/Sb	Corn, no-till, 40 percent soil cover after planting; disk for wheat; no-till soybeans	.10
C-W/Sb	Same as above except no-till wheat	.08
C-Sb-W/Sb	Corn, conventional tillage, spring plow; soybeans, wide-row, conventional tillage, spring plow; disk for wheat and soybeans	.24
C-Sb-W/Sb	Corn, no-till, 30 percent soil cover after planting; soybeans, wide-row, conventional tillage, spring plow; disk for wheat; no-till soybeans	.18
C-Sb-W/Sb	Corn, no-till, 40 percent soil cover after planting; soybeans, wide-row, no-till, 80 percent soil cover after planting; disk for wheat; no-till soybeans	.08

Source: C values for this table were calculated from the Soil Conservation Service's *Illinois Technical Guide*, Section I-C (EI Curve 19).

NOTE: The footnotes for Table 6 are the same as for Table 4. Please be sure to read all footnotes because values in this table are based upon assumptions detailed in the footnotes and your practices could be different from these assumptions.

NOTE: Values in this table are based on high level management with yields equal to or exceeding the following: corn, 100 bushels per acre; soybeans, 40 bushels per acre; wheat, 45 bushels per acre; oats, 60 bushels per acre; meadow, 3 tons per acre. For medium level management, multiply values by 1.2.

Table 7. C Values for Permanent Pasture, Range, and Idle Land

Vegetative canopy			Ground cover that contacts the soil surface						
Type	Height[a]	Percent cover[b]	Type[c]	0%	20%	40%	60%	80%	95+%
No appreciable canopy			G	0.45	0.20	0.10	0.042	0.013	0.003
			W	.45	.24	.15	.091	.043	.011
Tall weeds or short brush	20 in.	25	G	.36	.17	.09	.038	.013	.003
			W	.36	.20	.13	.083	.041	.011
	20	50	G	.26	.13	.07	.035	.012	.003
			W	.26	.16	.11	.076	.039	.011
	20	75	G	.17	.10	.06	.032	.011	.003
			W	.17	.12	.09	.068	.038	.011
Appreciable brush or bushes	6.5 ft.	25	G	.40	.18	.09	.040	.013	.003
			W	.40	.22	.14	.087	.042	.011
	6.5	50	G	.34	.16	.08	.038	.012	.003
			W	.34	.19	.13	.082	.041	.011
	6.5	75	G	.28	.14	.08	.036	.012	.003
			W	.28	.17	.12	.078	.040	.011
Trees but no appreciable low brush	13 ft.	25	G	.42	.19	.10	.041	.013	.003
			W	.42	.23	.14	.089	.042	.011
	13	50	G	.39	.18	.09	.040	.013	.003
			W	.39	.21	.14	.087	.042	.011
	13	75	G	.36	.17	.09	.039	.012	.003
			W	0.36	0.20	0.13	0.084	0.041	0.011

Note: The listed C values assume that the vegetation and mulch are randomly distributed over the entire area.

[a]In this table, height is not the actual height of the weeds, bushes, brush, or trees. It is the drop fall height, which is the average distance between the lowest twig, branch, or leaf and the ground (the average distance that a drop of water would fall unimpeded). The beneficial effects of canopy decrease as the drop fall height increases and are negligible when the drop fall height exceeds 33 feet.

[b]Percent canopy cover is the portion of the total surface area that would be hidden from view by canopy from an airplane (a bird's-eye view).

[c]*G* indicates that the cover at surface is grass, grasslike plants, decaying compacted duff, or litter at least two inches deep. *W* indicates that the cover at surface is mostly broadleaf herbaceous plants (weeds with few lateral root networks near the surface) or undecayed residues or both.

Table 8. C Values for Undisturbed Forest Land

Area covered by canopy of trees and undergrowth (percent)	Area covered by duff at least 2 inches deep (percent)	C value
20 to 40	40 to 70	0.006
45 to 70	75 to 85	0.003
75 to 100	90 to 100	0.0005

Table 9. Conservation Practices (P) Values for Contour Farming and Contour Strip Cropping

Slope percent	Contour farming		Contour strip cropping		
	P value	Maximum slope length (feet)[a]	P value R-G-M-M[b,c]	P value R-R-G-M[b,c,d]	Strip width (feet)[e]
1 to 2	0.60	400	0.30	0.45	130
3 to 5	.50	300	.25	.38	100
6 to 8	.50	200	.25	.38	100
9 to 12	.60	120	.30	.45	80
13 to 16	.70	80	.35	.52	80
17 to 20	.80	60	.40	.60	60
21 to 25	0.90	50	0.45	0.68	50

[a]Slope length limits are based upon limited data and field observations.

[b]R = row crop; G = small grain; M = meadow.

[c]Strip cropping is most effective when there are alternate strips and equal width of row crops and sod crops, for example, corn-corn-wheat with meadow seeding, meadow, meadow.

[d]A strip cropping rotation of corn-corn-wheat-meadow is less effective.

[e]To accommodate widths of farm equipment, generally adjust strip width downward.

Table 10. Values Used in Determining P Values for Terraces Built on Contour and Used in Combination with Contour Farming and Contour Strip Cropping

Terrace interval (feet)	Closed outlets[a]	Open outlets with percent slope of[b]		
		0.1-0.3	0.4-0.7	≥0.8
Less than 110	0.5	0.6	0.7	1.0
110 to 140	0.6	0.7	0.8	1.0
140 to 180	0.7	0.8	0.9	1.0
180 to 225	0.8	0.8	0.9	1.0
225 to 300	0.9	0.9	1.0	1.0
300 and up	1.0	1.0	1.0	1.0

[a]Values for closed outlet terraces also apply to terraces with underground outlets and to level terraces with open outlets. However, closed outlet terraces are not normally built in Illinois because of the large amount of rainfall in Illinois.

[b]The channel slope is measured on the 300 feet of terrace closest to the outlet or on the third of the total terrace length closest to the outlet, whichever distance is less.

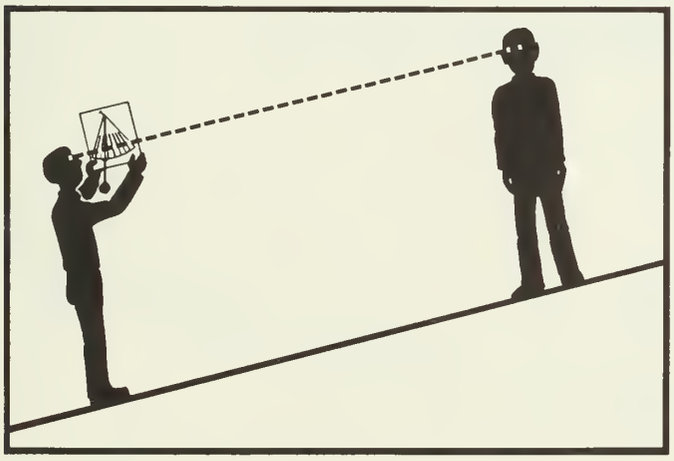
How to Make and Use a Slope Gauge

How to Make

1. Glue, tack, or tape the slope gauge sheet (located on page 00) on a 9-inch by 12-inch board. A ½-inch plywood or ¾-inch thick board works best. Also, you may want to attach these directions to the opposite side of the board.
2. Place a small eye screw or nail at Point 1 on the slope gauge sheet.
3. Hang a string from the eye screw or nail. Let the bottom of the string hang 1 to 2 inches below the bottom of the board.
4. Attach a weight, such as a fish line sinker, at the end of the string.
5. Place two small finishing nails or wire brads at Points 2 and 3 on the slope gauge sheet. These are the sighting pins.

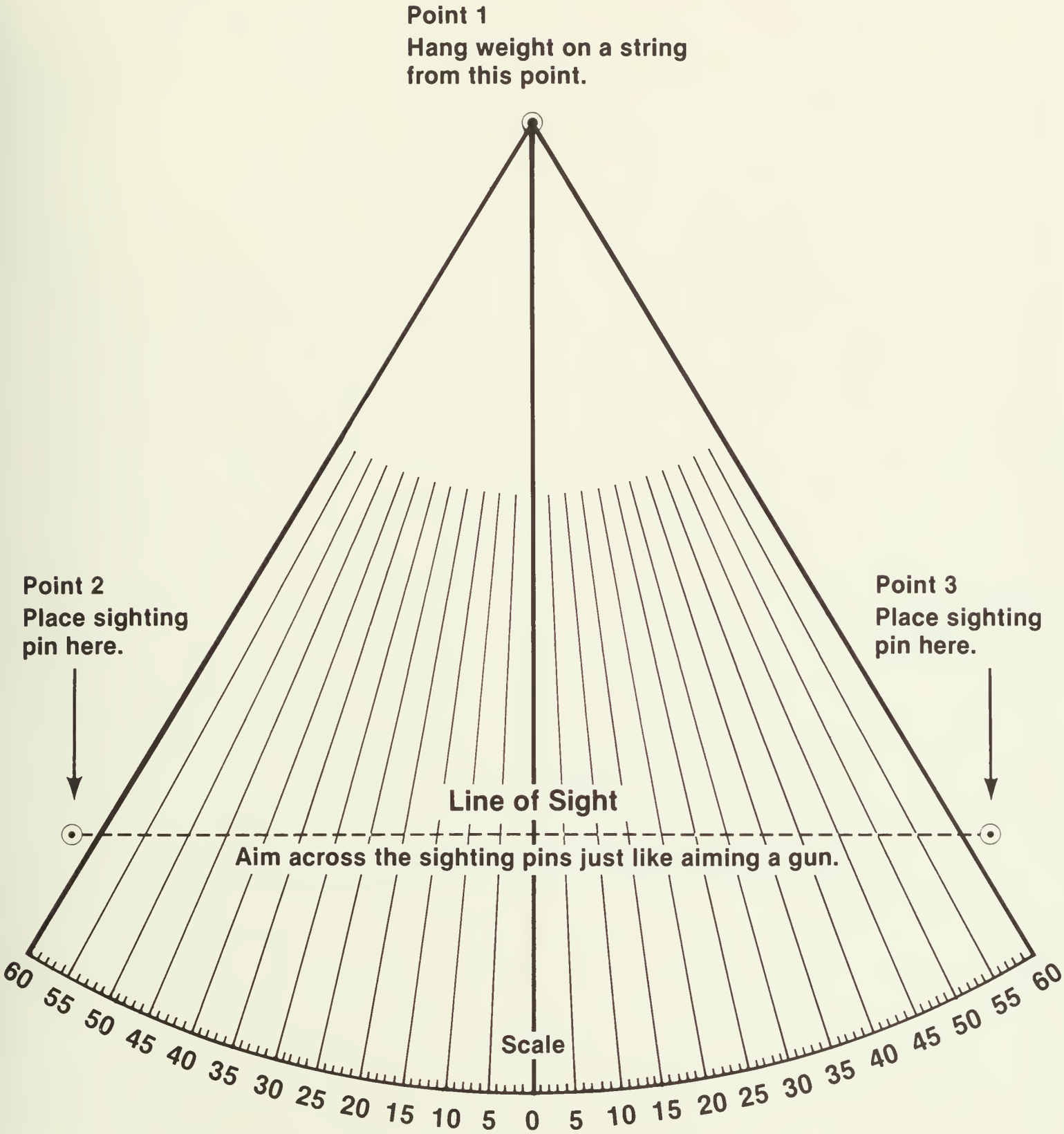
How to Use

1. Keep the sighting pins in your line of vision and aim at the point on an object or person that is the same height from the ground as your eyes. For example, let's assume you're aiming at a person who is taller than you. If that person's chin is the same height from the ground as your eyes, aim for his chin (see figure). If you're aiming at a stick, tie a ribbon around the point on the stick that is at your eye level; then aim at the ribbon.



2. The person or object does *not* need to be any particular distance away.
3. You can aim the slope gauge either up or down the slope.
4. Hold the slope gauge as steady as possible and make sure the weighted string can swing easily across the scale.
5. After you have finished sighting, hold the string at the point where it comes to rest on the scale.
6. Read the percent of slope directly from the scale and record your measurement. You may want to take several measurements on the same slope to check your accuracy.

Slope Gauge



Read percent of slope directly on this scale. At the point where string rests on scale, the number indicates percent of slope.

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