A3533

Estimating residue using the line-transect method

Nyle C. Wollenhaupt and John Pingry

Soil erosion can be substantially reduced, and in some fields controlled, by keeping the land surface partially covered with crop residue. As little as a 30% ground cover (measured immediately after planting) can reduce erosion by 50%.

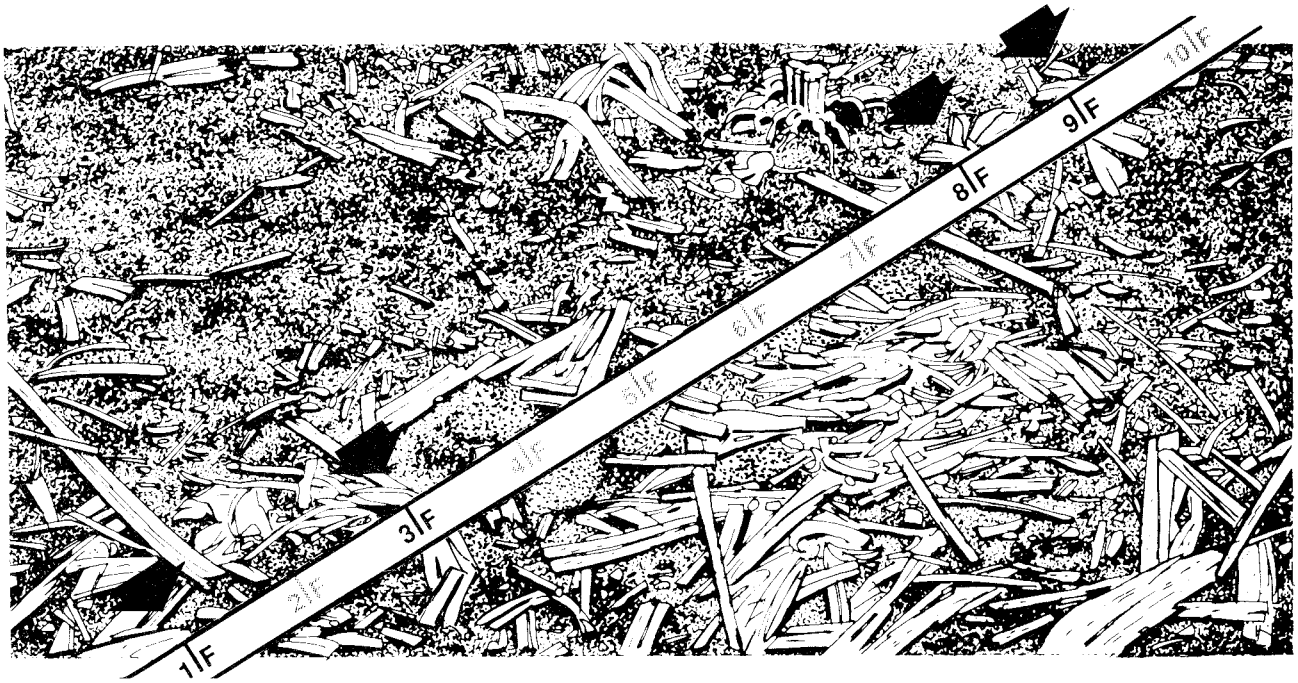
Many Wisconsin farmers have chosen conservation tillage (30% or more ground cover) as part of their conservation compliance plan. To implement and check conservation plans, producers, consultants and agency professionals need to use reliable residue measurement techniques.

Residue can be measured using a variety of methods including photographic, meterstick, and line-transect. The line transect method has emerged as the preferred method for field use (Laflen et al., 1981). This procedure involves stretching a line diagonal to the crop rows and recording whether or not residue intersects the line at specified points.

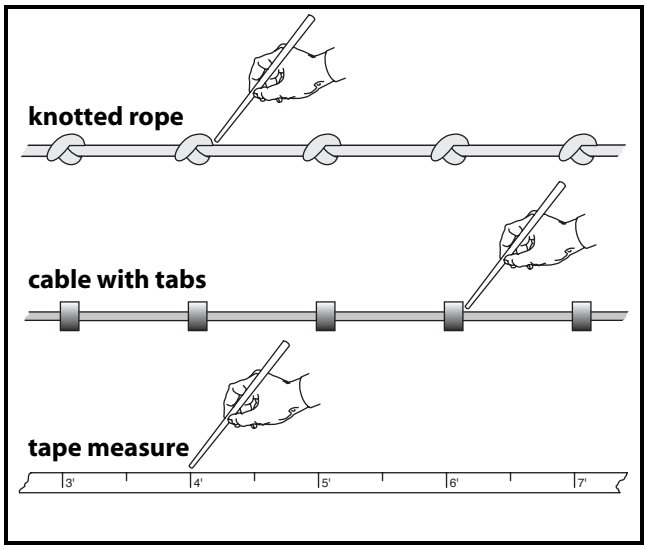
Equipment

The line may be a wire cable with beads or tabs attached at a fixed spacing, a knotted rope or a tape measure. The line should be 100-feet long with markings at 1-foot intervals or 50-feet long with markings at 6-inch intervals. The idea is that each time you stretch the line and record residue intersects, you will evaluate 100 points. This will keep calculations simple.

30% ground cover



Lay out a 100-foot line across crop rows at a 45-degree diagonal. Anchor both ends in a row. Look straight down at each 1-foot mark, always choosing the same point on the line. Count the number of times that crop residue intersects the line at the 1-foot marks. Arrows highlight recording points which intersect residue. (Illustration courtesy University Extension, University of Missouri-Columbia)



Three common types of lines used to measure residue transect. Always take readings from the same point or corner on the line.

Sources of error

The main source of error with this technique is the tendency to adjust one's line of site when looking down at the intersection points on the line. To keep this error to a minimum always read from the same side of the tape or in the case of a knotted rope or cable, the same corner of the knot or tab junction with the line. To maintain a constant line of site, obtain a $^{3}/_{32}$-inch diameter (●) brazing rod or wooden dowel from a farm supply or hardware store and hold it at each line intersection point. Imagine that the rod tip represents a raindrop and ask the question: Will the residue at the point of measurement absorb most of the raindrop impact?

Procedure

The following is a step-by-step procedure for using the line transect method to measure the percentage of crop or plant residue ground cover.

Step 1. Lay out a 100- or 50-foot line diagonal to row direction. Anchor both ends. Avoid placing the line in end rows and areas affected by flooding, drought, weed or insect infestations.

Step 2. Walk along the line or tape and look straight down at each recording point. Record the number of points that are directly over a piece of residue. As you record numbers, remember to

- ➤ always look at the same side of the line,
- ➤ avoid moving the tape while counting, and
- ➤ look straight down.

There will be some judgment calls. To decide whether the residue intersects the mark, ask yourself this: If a raindrop falls at this point on the line, will it hit crop residue or bare soil? If you have any doubt whether the point intersects residue, or if the residue looks too small to intercept a raindrop, don't count it.

Step 3. The total number of intersections you found equals the percentage of ground surface covered by residue. If 44 out of 100 points intersect residue, then you have 44 percent residue coverage in this area of the field.

Step 4. Repeat the procedure at five random locations in the field and average the results to arrive at an estimate of residue cover for the entire field.

Additional information

Colvin, T.S., and J.E. Gilley. 1987. Crop residue: Soil erosion combatant. *Crops and Soils Magazine*. April–May p. 7–9.

Laflen, J.M., M. Amemiya and E.A. Hintz. 1981. Measuring crop residue cover. *Journal of Soil and Water Conservation*. November–December p. 341–343.

Shelton, D.P., E.C. Dickey, P.J. Jasa, R. Kanable and S.R. Smydra. 1990. *Using the line-transect method to estimate percent residue cover*. NebGuide G90-981. Cooperative Extension, University of Nebraska, Lincoln, NE

Authors: Nyle C. Wollenhaupt is assistant professor of soil science, College of Agricultural and Life Sciences, University of Wisconsin-Madison and University of Wisconsin-Extension, Cooperative Extension. John Pingry is an agronomist with the Soil Conservation Service, Madison, Wisconsin.

University of Wisconsin-Extension, Cooperative Extension, in cooperation with the U.S. Department of Agriculture and Wisconsin counties, publishes this information to further the purpose of the May 8 and June 30, 1914 Acts of Congress; and provides equal opportunities in employment and programming including Title IX requirements.

This publication is available from your Wisconsin county Extension office or from Cooperative Extension Publications. To order, call toll free 877-947-7827 (877-WIS-PUBS) or visit cecommerce.uwex.edu.

A3533 Estimating Residue Using the Line-Transect Method RP-08-91