Using the Line-Transect Method to Estimate Percent Residue Cover

David P. Shelton
University of Nebraska-Lincoln, dshelton2@unl.edu

Elbert C. Dickey
University of Nebraska at Lincoln, edickey1@unl.edu

Paul J. Jasa
University of Nebraska at Lincoln, pjasa1@unl.edu

Roger Kanable
USDA Natural Resources Conservation Service

Susan Smydra Krotz
University of Nebraska-Lincoln

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Using the Line-Transect Method to Estimate Percent Residue Cover

David P. Shelton, Extension Agricultural Engineer; Elbert C. Dickey, Extension Agricultural Engineer-Conservation; Paul J. Jasa, Extension Engineer-Conservation Tillage; Roger Kanable, Conservation Agronomist, Soil Conservation Service; Susan R. Smydra, Extension Assistant

This NebGuide describes how to use the line-transect method to estimate the percentage of crop residue cover on the soil surface.

Crop residue left on the soil surface is one of the easiest and most cost-effective methods of reducing soil erosion. Research in Nebraska and other Midwestern states shows that leaving as little as 20 percent of the soil surface covered with crop residue can reduce soil erosion by as much as one-half of what it would be from residue-free conditions. Greater amounts of residue cover further limit soil erosion, Figure 1.

Residue reduces erosion in two ways. First, the residue dissipates raindrop impact energy, reducing the amount of soil that is detached. Residue also forms a series of intricate obstructions or small dams that slows any flowing water. This reduces the amount of soil that can be transported. (Refer to NebGuide G81-544, Residue Management for Soil Erosion Control, for further details on the erosion process and the benefits of residue cover.)

Historically, the term “conservation tillage” was used to describe any tillage and planting system that did not use a moldboard plow.

The current definition of conservation tillage that has been adopted by the Soil Conservation Service specifies that at least 30 percent of the soil surface must be covered with crop residue following planting to reduce soil erosion by water. So when a Conservation Plan indicates conservation tillage will be practiced, the producer has agreed to leave a minimum of a 30 percent cover after all tillage and planting operations have been completed.

Many Conservation Plans specify that crop residue cover left after planting will be the primary erosion control method. The required amount of cover ranges from 30 percent (conservation tillage) to as much as 85 percent.

It can be extremely important to accurately determine percent residue cover to assure compliance. Residue cover cannot be estimated merely by looking across a field. Such estimates, often made from the road or edge of the field, grossly over-exaggerate the actual amount of cover. Measurements or estimates of residue cover can only be obtained from within the field, looking straight down at the soil and residue.

There are a number of methods to estimate residue cover. These include direct observations, calculations, photo comparisons, and the line-transect method. (Refer to NebGuide G86-793, Estimating Residue Cover, for a brief description of these methods.)

The line-transect method is one of the easiest and most
accurate methods of estimating residue cover. This is the method used by the Soil Conservation Service.

To use the line-transect method, a measuring tape is stretched across a section of the field, and it is determined if there is residue beneath each foot mark on the tape. By counting the number of foot marks directly over residue, the percentage of residue cover can be obtained.

Following is a step-by-step procedure for using the line-transect method.

Find a representative area:
Select an area that is representative of the whole field. Avoid end rows, or small areas of the field that have been adversely affected by flooding, drought, weed or insect infestations, or other factors that could result in substantially reduced yields.

Use a measuring tape:
A 100 foot or a 50 foot measuring tape can be used. Other measuring tape lengths or even knotted ropes could be used as long as the appropriate multiplication factor for different lengths are used in calculating the percent residue cover.

Stretch tape diagonally across crop rows:
Anchor one end of the tape and stretch it diagonally across the rows so it crosses several passes of the implements used. Doing this avoids inaccurate readings such as those obtained if the measurements were all taken in a windrow of residue left by the combine, or all in an area of reduced amounts of residue.

Check for residue at each foot mark:
Residue cover is measured by counting the number of foot marks directly over a piece of residue. When looking at the tape, there are several rules that need to be followed:

1. do not move the tape while counting;
2. look at the same side of the tape at each foot mark;
3. look straight down at the tape and foot mark.

Leaning from side to side will result in overestimating because residue may appear to be under the foot mark when it really is not. To get an accurate measurement, count only those foot marks that have residue exactly under them, 

Determine percent cover:
The number of foot marks on a 100 foot tape that are directly over residue will be a direct measurement of the percentage of residue cover for the field. If a 50 foot tape is used, multiply the number of foot marks counted by two to get the actual percentage of cover.

Take more than one measurement:
A more accurate determination of residue cover will be obtained by taking an average from at least three different representative locations in the field.

Conclusion
Conservation tillage, or leaving at least 30 percent of the soil surface covered with residue following planting, is the most cost-effective method of reducing soil erosion available to Nebraska farmers. Accurate determinations of percent residue cover are required to assure enough cover is present to adequately reduce erosion and to comply with the conservation provisions of the 1985 Food Security Act. The line-transect method is one of the easiest and most accurate methods of determining percent residue cover.

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