

TECHNICAL NOTES

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THE LINE-TRANSECT METHOD OF MEASURING CROP RESIDUE COVER

Maintaining minimum levels of residue ground cover has been emphasized by the Conservation Tillage practice which requires at least 30 percent after planting. We have also used pounds per acre of small grain residues in some areas to equate to 30 percent ground cover or some other minimum cover. The pounds per acre method is labor intensive because samples need to be clipped and bagged. Then air dried and weighed. A quicker and more accurate method is the Line-Transsect method.

The 1985 Food Security Act requires growers producing annually planted crops on Highly Erodible (HEL) fields to develop a conservation plan and reduce erosion to an acceptable level. Many of these plans are based on minimum levels of residue cover. Many growers will need to adjust their cultural operations to maintain the minimum level. These adjustments will be progressive each year and growers will want to know how much residue they have.

TRAINING TOOL

The Line-Transsect method is an easy, reliable way to determine residue cover. It should be used as a training tool to improve the ability of Soil Conservation Service and Resource Conservation District staffs to perform estimates of percent ground cover.

Use the Line-Transsect method to improve your visual skill in making residue cover estimates. Make an estimate using the visual method and then compare the result with the Line-Transsect results.

Crop residues vary widely in volume and density. For example, small grain stems are narrow and rigid, while safflower stems are thick but somewhat brittle. Erosion reduction is different with each kind of residue.

Avoid using the Line-Transsect method for FSA conservation plan status reviews. When it is necessary to make an FSA compliance check, use the visual method to judge percent cover. After the status review and when the grower is interested, it can be used as part of a training exercise.

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ASSISTANCE TO GROWERS

We also want to use it to assist growers recognize residue amounts and the reduction in residues caused by each of their tillage operations. Encourage growers to first make a visual estimate before using the Line-Transect method.

Some growers make visual estimates in the field or from the road to figure out how much of the soil surface is actually covered. However, these are inaccurate methods and often result in overestimating residue cover. The exposed, bare soil behind the residue will be hidden from view, making it look like more of the surface is protected with residue. Overestimating the level of protection will result in underestimating the rate of soil erosion.

After taking measurements in the field, growers may find that their operations did not leave the amount of surface cover specified in their conservation plan. Therefore, to meet conservation goals the next year, they may need to eliminate some tillage passes or adjust machinery to leave more residue.

In other cases, growers may find that their operations left more residue than called for in their conservation plan. This will give them more flexibility to adjust field operations. Encourage growers to estimate surface cover several times each year and keep accurate records of the measurements.

THE SAME METHOD BY OTHER NAMES

This method has also been called the "Point-and-Line" method, "Line-and-Point" method, Knotted Rope method, and Knotted Cord method.

EQUIPMENT

Any 50 foot or 100 foot tape, knotted cord, or knotted rope that has 100 equally spaced points or markers can be used. However, all of the following instructions will refer to using a 50 foot knotted cord.

To make a 50 foot knotted cord, start with 70 feet of a 1/8-inch nylon cord. Tie 100 knots, 6 inches apart. Make the knots about 1/16" in diameter. Each knot with proper residue below will then equal one percent cover.

FIELD PROCEDURE

The two most important times to estimate and measure residue cover are right after harvest and right after planting. Consider additional measurements when changes in equipment or operations occur.

Select a representative residue area for that field on the critical soil mapping unit or HEL soil map unit used to plan the erosion control subsystem.

Do not take measurements in turn-row areas.

Stretch the knotted cord diagonally at a 45 degree angle across the crop rows. Both ends of the rope should be anchored in a row. See Figure 1.

Then walk along the knotted cord and look straight down on each knot.

When looking down at the knots, be sure to look at the same small point at the corner of each knot.

Use the leading or trailing edge of the knot. If leading edge is used, all leading edges will be used.

Next, count the number of knots that intersect a piece of crop residue.

Only substantial, durable residue like stems and straw, is counted as a "hit". Fragile leaves and fine chaff are not counted.

To decide whether a knot intersects a piece of residue, ask yourself, "If a raindrop falls at this point, would it hit residue or bare soil?" If there is any doubt at all, do not count it.

The number of knots that intersect residue equals the percentage of surface covered.

If you count 30 knots that intersect a piece of residue, then 30 percent of the surface is covered.

Measure three to five transects in the representative residue area.

Add the counts from all the transects and average them to obtain the estimate of percent cover.

Measure five or more transects on one or two representative residue areas on fields larger than 100 acres.

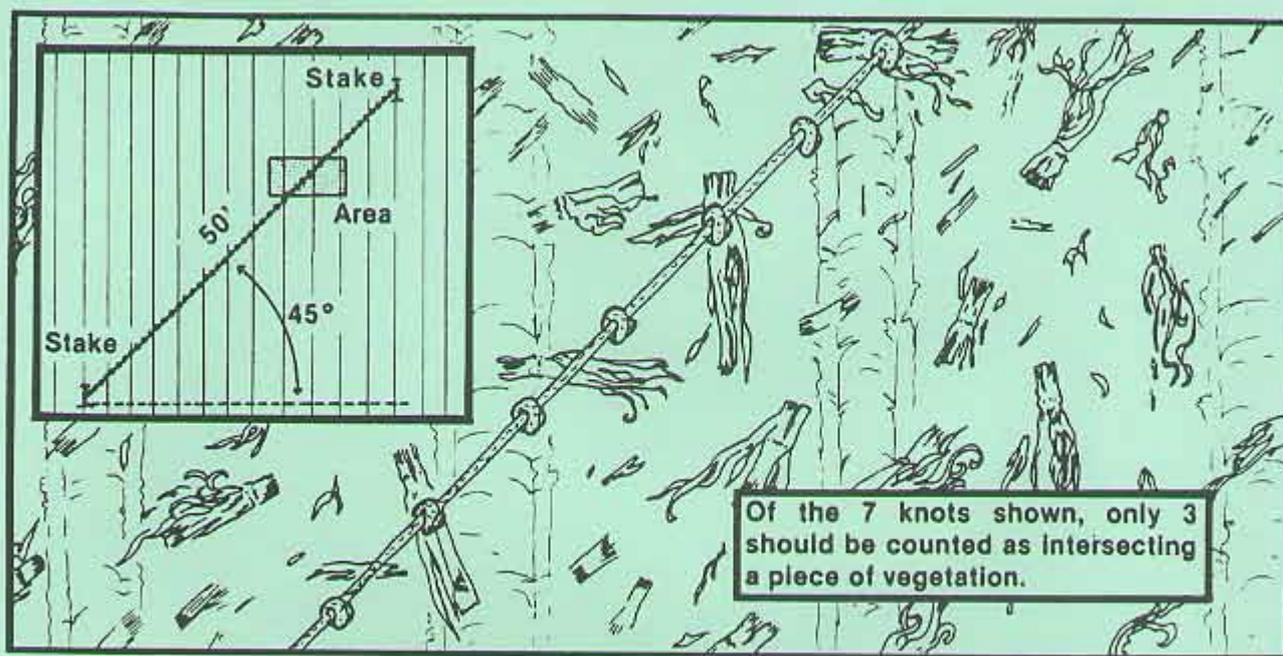


Figure 1. Overview (inset) and close-up of the line-transect method. (Source: Illinois Cooperative Extension Service.)

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