



Agronomy Tech Note #MN-19

Estimating crop residue cover

The line transect method

The line transect method has been proven effective in estimating the percent of the ground surface covered by plant residue at any time during the year.

Estimates of percent cover are used for determining the impact of residue on sheet and rill erosion. They cannot be used directly for determining the impact of residue on wind erosion.

Estimates of percent cover obtained using the line transect method to evaluate the impact of residue on sheet and rill erosion are most accurate when the residue is lying flat on the soil surface and is evenly distributed across the field.

The following is the recommended procedure for using the line transect method:

An infographic with a dark blue background and green and yellow text. The title is in large, bold, green capital letters. Below the title is a bulleted list of seven steps in yellow text.

**ESTIMATING RESIDUE COVER
USING THE
LINE-TRANSECT METHOD**

- Use line or tape with 100 points or marks
- Stretch diagonally across the rows
- Walk entire length of the line/tape
- Count marks that intersect with residue
- Use same point on each mark
- Count only 1/8" and larger residue
- Repeat at least five times
- Average the counts





Figure 1: The line is stretched across the rows or direction of tillage

Use a commercially available 50 or 100 foot long cable, tape measure or any other line that has 100 equally spaced beads, knots or other marks at which to sight.

Select an area that is representative of the field as a whole, and stretch the line out across the crop rows. The line may be oriented perpendicular to the rows or in a direction that is at least 45 degrees off the row direction.

The locations in the field where the line is stretched out to make measurements should be selected randomly from among areas of the field that are typical of the entire field. End rows, field borders, and parts of the field that appear different are probably not typical of the entire field and should be avoided.



Figure 2: Select one point or corner of the mark. Look at that same point at each mark along the tape.

Walk along the line, stopping at each mark. Position the eye directly over the mark, and look down at it. **When sighting, do not look at the entire mark.** Rather, look at a single, selected point at each mark.



Figure 3: Remember only the one corner or point on the mark is used for counting, not the entire mark.

A point has an area about like the end of a needle. On commonly used equipment, the knots, beads or marks have much larger areas than the end of a needle. **A measurement is not based on whether or not some portion of a mark is over residue.** It is based on whether or not a specific **point** on the mark is over residue. One way to accomplish this is to select the place along the line where a bead or mark begins as the point of reference.



Figure 4: Walk the entire length of the tape or line looking straight down over the point selected for counting.

Determine the percent residue cover by counting the number of points at each mark along the line under which residue is seen. Count only from one side of the line, and for the selected point at each mark. Do not move the line while counting.

Count only the residue large enough to intercept rain drops. A rule of thumb is to count only residue that is 3/32 inch in diameter or larger.

When using a line with 100 points, the percent residue cover is equal to the number of points under which residue is seen.

Three to five transects should be done in each field, using the procedure described above. Five are recommended.

With five measurements, estimates of percent residue cover are accurate to within (+) or (-) 15 percent of the mean. Three measurements will give estimates accurate to within (+) or (-) 32 percent of the mean.

For example, if the mean of 5 measurements was 50 percent, you could be confident (at the 95 percent confidence level) that the true mean was somewhere between 42.5% and 57.5%. For a 30 percent average based on 5 measurements, you could be confident that the true value was between 25.5% and 34.5%.

Documentation should be done in a way that permits easy tracking from the field measurements to the final answer. The development and use of a documentation worksheet is recommended. A worksheet for use in documenting residue checks is attached.

References

1. Laflen, J.M., M. Amemlya, and E.A. Hintz. 1981. "Measuring Crop Residue Cover", Journal of Soil and Water conservation, Vol. 36, No. 6, pgs. 341-343.
2. Richards, B.K., M.F. Walter, and R.E. Much. 1984. "Variation in Line Transect Measurements of Crop Residue Cover", Journal of Soil and Water Conservation, Vol. 39, No. 1, pgs. 60-61.
3. Agricultural Research Service, National Soil Erosion Research Laboratory, West Lafayette, Indiana.

CROP RESIDUE COVER DOCUMENTATION WORKSHEET

Tract No.: _____ Producer's Name: _____

Crop residue surface cover was measured using the line transect procedure for the field(s) listed below. Five 100 point counts were made on each field at locations shown on the attached map. The results of these field measurements are:

Field Number: _____ Planned Residue Cover: _____%
 Residue Counts: _____% + _____% + _____% + _____% + _____% = $\frac{\quad}{5}$ = _____%
(Mean)

Tolerance Limits: Low - Mean % _____ x 0.85 = _____%
 High - Mean % _____ x 1.15 = _____%

Field Number: _____ Does - Does Not meet residue requirements.
 (Circle One)

Field Number: _____ Planned Residue Cover: _____%
 Residue Counts: _____% + _____% + _____% + _____% + _____% = $\frac{\quad}{5}$ = _____%
(Mean)

Tolerance Limits: Low - Mean % _____ x 0.85 = _____%
 High - Mean % _____ x 1.15 = _____%

Field Number: _____ Does - Does Not meet residue requirements.
 (Circle One)

Field Number: _____ Planned Residue Cover: _____%
 Residue Counts: _____% + _____% + _____% + _____% + _____% = $\frac{\quad}{5}$ = _____%
(Mean)

Tolerance Limits: Low - Mean % _____ x 0.85 = _____%
 High - Mean % _____ x 1.15 = _____%

Field Number: _____ Does - Does Not meet residue requirements.
 (Circle One)

Field Number: _____ Planned Residue Cover: _____%
 Residue Counts: _____% + _____% + _____% + _____% + _____% = $\frac{\quad}{5}$ = _____%
(Mean)

Tolerance Limits: Low - Mean % _____ x 0.85 = _____%
 High - Mean % _____ x 1.15 = _____%

Field Number: _____ Does - Does Not meet residue requirements.
 (Circle One)

Technical Staff Signature: _____ Date: _____

ATTACH THIS WORKSHEET TO MAP(S) AND FILE IN THE PRODUCER CASE FILE