NEBRASKA TECHNICAL NOTE
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

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MANAGING CROP RESIDUE

Facts

A. Water Erosion

Percent of cover is more important than weight of residue remaining on the soil surface, for reducing water erosion.

B. Wind Erosion

Standing residue in pounds is more effective in reducing wind erosion than percent of ground cover.

Estimating Residues

The more crop residue you leave on the soil surface from harvest of one crop until planting the succeeding crop, the better you will be able to control soil erosion and conserve moisture. The amount of surface cover or pounds per acre is determined largely by the amount of residue produced in the first place and the choice of a tillage system.

Normally the higher the yield 1/, the greater quantity of residue. The following table provides guidelines for estimating the amount of residue produced by a given crop.

1/ There are times in crop production, especially during the vegetative stage of growth, the moisture supply is adequate but turns off dry during the grain formation time and residue ratio to yield is not always constant. Residue produced is better coordinated to the intended or projected yield rather than accrual yield.

Pounds of Residue Produced Per Bushel of Crop Yield

Winter Wheat	100 - 138	
Spring Wheat	60 - 75	
Oats	50 - 60	
Barley	60 - 72	
Rye	120 - 174	
Corn	56 - 75	
Sorghum	1.4 - 1.5	ratio residue to grain
Soybeans	60 - 100 2/	
*Field beans	30 - 50	
*Sugarbeets	10 - 15	per ton beets

2/ Soybeans in vegetative Zone 4 will produce a minimum of 2500 pounds residue with no yield.

* J. A. Smith and C. D. Yonts, University of Nebraska Panhandle Research Station.

Once you have estimated the amount of residue produced you will need to select the tillage operation so you will end up with enough residue to provide sufficient cover.

Residue Left by Various Tillage Implements

The lower end of the percentage range listed corresponds to fragile residues such as poor stands or wide rows and dryland production, while the upper end of the range corresponds to irrigated residue.

Tillage and Planting Implements	Percent of Residue Remaining After Each Operation 1/
Subsurface Implements:	
Blades (36" or wider)	90
Sweeps (24" or wider)	90
Rodweeders - plain rod	90
Rodweeders - with semi-chisels	80
Mixing Implements:	
Heavy-duty cultivator (16" - 22" sweeps)	85
Field or duckfoot cultivator (shovels or narrow sweeps)	80
Heavy-duty cultivator (shovels and chisels)	75

Tillage and Planting Implements	Percent of Residue Remaining After Each Operation 1/
Moldboard Plow	3 - 5
Chisel Plow	
Straight shovel points	50 - 75
Twisted shovel points	30 - 60
Anhydrous Applicator	50 - 80
Disk (Tandem or Offset)	
3" deep	40 - 70
6" deep	30 - 60
Field Cultivator	50 - 80
Planters	
No coulter or smooth coulter	90 - 95
Narrow ripple coulter (less than 1.5" flutes)	85 - 90
Wide fluted coulter (greater than 1.5" flutes)	80 - 85
Sweeps or double disk furrowers (till-plant)	60 - 80
Drills	
Disc openers	90 - 95
Hoe openers	50 - 80
Winter Weathering	70 - 90

1/ Use lower values for fragile residue such as soybeans.

A rough estimate of the residue cover remaining after using a tillage and planting system can be obtained by multiplying the percentages together for each operation within the selected system. Corn, grain sorghum, and small grains generally will leave about 95 percent of the soil surface covered with residue following harvest, assuming the residue is uniformly spread behind the combine. However, following soybean harvest, only a 70 to 80 percent residue cover will remain.

For example, assume a tillage and planting system with three operations: (1) chisel plowing with straight points, (2) disking 6 inches deep, and (3) a planter with no coulter is used on a field of irrigated corn residue. The initial residue cover for irrigated corn is 95 percent and winter weathering losses would reduce the cover to 86 percent as shown by the following calculation:

0.95	x	0.90	=	0.86
initial		weathering factor		spring residue cover

Following tillage and planting the residue cover would be about 37 percent.

0.86	x	0.75	x	0.60	x	0.95	=	0.37
spring residue	x	chisel	x	disk	x	plant	=	final residue cover

Using the same tillage and planting operations in soybean residue would result in about 9 percent residue cover.

70	x	0.70	x	0.50	x	0.40	x	0.90	=	.09	
initial	x	weathering	x	chisel	x	disk	x	plant	=	final residue cover	

Consider this method to be a rough estimate since the variables involved prevent accurate estimates of residue cover. However, the table can be useful in planning tillage operations by offering a general idea of how much residue will remain for specific operations.

Field Measurements

A. The line-transect method of measuring percentage of ground cover is done with a tape or cable 50 feet long. 1/ The tape or cable is stretched perpendicular to crop rows and oriented so that each end is over a row. There are 100 points spaced 6 inches apart on a 50-foot cable or tape. Percent residue cover is the number of points divided by 100 over residue. A point is over residue if, in the opinion of the observer, one end of the point, where it intersects the cable or tape, is over residue. The same side of a tape or cable and measuring point is read each time. If that part of the measure point is not over residue, the point is not counted, even if other portions of the point are over residue. If there is a doubt, point is not counted. A minimum of (3) three separate measurements is required.

B. The average of three (3) separate measurements will be the standard for obtaining percentage of ground cover.

1/ Any tape, rope, or cable 25-feet to 100-feet long can be used as long as points are equally spaced.

Reference - Neb Guide G81-554
Chevron Chemical Co., J. W. Doran, W. W. Wilhelm and J. F. Power