



Relationship of residue weight to percent residue cover for various crops.

Example: Dashed lines with arrows illustrate the procedure to convert weight to percent residue cover. Corn residue weighing 5,000 lb · acre⁻¹ at harvest leaves 82% residue cover, and 2,500 lb · acre⁻¹ leaves 57% cover. Note that, in this example, a 50% reduction in residue weight results in a 25% reduction in residue cover.

CONVERTING CROP YIELDS TO POUNDS OF RESIDUE

Crop	Residue/Crop Ratio	Bushel Weight		Pounds of Residue/Bushel
		Lbs.	Kg.	
Winter wheat	1.7	60	27.2	102
Soybeans	1.25	60	27.2	75
Rye	1.5	56	25.4	84
Spring wheat	1.3	60	27.2	78
Barley	1.5	48	22	72
Oats	2.0	32	14.4	64
Corn	1.0	56	25.4	56
Sorghum	1.0	56	25.4	56
Field beans	0.7	60	27.2	40
Sugarbeets	-	-	-	2500

Crop Residue = (straw/grain ratio x bushel weight x crop yield) or (lbs. of residue/bushel x crop yield)

ESTIMATES OF RESIDUE COVER REMAINING AFTER SINGLE OPERATION OF SELECTED TILLAGE MACHINES

Each tillage or planting leaves a percent of the residue that was present just prior to that operation. The following tables are classified as being either Non-Fragile or Fragile. See list below. This is a subjective classification based in part on the ease in which crop residues are decomposed by the elements or buried by tillage operations. Plant characteristics such as composition and size of leaves and stems; density of the residue; and relative quantities produced were considered.

Many factors effect the amount of residue left after a pass with a tractor and tillage or planting machine. Residue levels are sensitive to depth and speed of equipment operation and to row spacing. When selecting values from the ranges in Table 2. for a specific machine, consider the following general rules of thumb. (1.) At shallower operating depths greater amounts of residue are left on the surface, while at deeper operating depths, more residue is buried. (2.) Slower operating speeds tend to leave more residues on the surface while at faster speeds more residues are buried. Under some conditions field cultivators and other finishing tools with field cultivator gangs and some planters and drills may return as much as 20% of the residue incorporated at shallow depths by recent previous operations. Excess wheel slippage caused by improper ballasting of tractor tires can destroy valuable residues in the wheel tracks.

Use the figures as a guide in selecting the types of equipment and types of blades, points or sweeps to be used in the tillage system. Measure the actual amount of residue being left by the operation and make adjustments accordingly.

NONE FRAGILE

Alfalfa or legume hay
Barley*
Buckwheat
Corn
Cotton
Flaxseed
Forage Seed
Forage Silage
Grass hay
Millet
Oats
Pasture
Pineapple
Popcorn
Rice
Rye*
Sorghum
Speltz*
Sugarcane
Tobacco
Triticale*
Wheat*

RESIDUE TYPES

FRAGILE

Canola/Rapeseed
Dry Beans
Dry Peas
Fall seeded cover crops
Flower seed
Grapes
Green peas
Guar
Lentils
Mint
Mustard
Peanuts
Potatoes
Safflower
Soybeans
Sugar Beets
Sunflowers
Sweet Potatoes
Vegetables

* If a combine is used with a straw chopper or otherwise cuts straw into small pieces in harvesting small grain then the residue should be considered as being fragile.

REDUCE CROP RESIDUE ACCORDING TO TILLAGE OPERATIONS

PERCENT RESIDUE REMAINING AFTER EACH TRIP OR PASS OVER THE FIELD

<u>IMPLEMENT</u> ^{1/}	<u>NON FRAGILE</u>	<u>FRAGILE</u>
PLOWS:		
Moldboard plow	0-10	0-5
Disk Plow	10-20	5-15
MACHINES WHICH FRACTURE SOIL:		
Paratill/Paraplow	80-90	75-85
"V" ripper/subsoiler 12-14" deep 20" spacing	70-90	60-80
Combination Tools:		
Subsoil-chisel	50-70	40-50
Disk-subsoiler	30-50	10-20

^{1/} Developed jointly by the SCS, USDA and the Equipment Manufacturers Institute.
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<u>IMPLEMENT 1/</u>	<u>NON FRAGILE</u>	<u>FRAGILE</u>
CHISEL PLOWS With:		
Sweeps	70-85	50-60
Straight chisel spike points	60-80	40-60
Twisted points or shovels	50-70	30-40
COMBINATION CHISEL PLOWS:		
Coulter Chisel plows with:		
Sweeps	60-80	40-50
Straight chisel spike points	50-70	30-40
Twisted points or shovels	40-60	20-30
Disk Chisel plows with:		
Sweeps	60-70	30-50
Straight chisel spike points	50-60	30-40
Twisted points or shovels	30-50	20-30
DISKS, HARROWS:		
Offset		
Heavy plowing 10" spacing	25-50	10-25
Primary cutting 9" spacing	30-60	20-40
Finishing 7" 9" spacing	40-70	25-40
Tandem		
Heavy Plowing 10" Spacing	25-50	10-25
Primary cutting 9" spacing	30-60	20-40
Finishing 7" 9" spacing	40-70	25-40
Light tandem disk after harvest, before other tillage	70-80	40-50
One-way disk with:		
12" 16" blades	40-50	20-40
18" 30" BLADES	20-40	10-30
Single gang disk	50-70	40-60
FIELD CULTIVATORS:(Including leveling attachments)		
Used as the primary tillage operation:		
Sweeps 12-20"	60-80	55-75
Sweeps or shovels 6-12"	35-75	50-70
Duckfoot points	35-60	30-55
Field Cultivators as secondary Operation following chisel or disk:		
Sweeps 12 20"	80-90	60-75
Sweeps or shovels 6-12"	70-80	50-60
Duckfoot points	60-70	35-50

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<u>IMPLEMENT</u> ^{1/}	<u>NON FRAGILE</u>	<u>FRAGILE</u>
FINISHING TOOLS:		
Combination finishing tools with:		
Disks, shanks and leveling attachments	50-70	30-50
Spring teeth & rolling basket	70-90	50-70
Harrows:		
Springtooth (coil tine)	60-80	50-70
Spiketooth	70-90	60-80
Flexetooth	75-90	70-85
Roller harrow (cultipacker)	60-80	50-70
Packer roller	90-95	90-95
Rotary Tiller:		
Secondary operation 3: deep	40-60	20-40
Primary operation 6" deep	15-35	5-15
STRIP TILLAGE MACHINES:		
Rotary Tiller 12" tilled on 40" rows	60-75	50-60
Row Buster	60-75	50-60
ROW CULTIVATORS: (30" and wider)		
Single sweep per row	75-90	55-70
Multiple sweeps per row	75-85	55-65
Finger wheel cultivator	65-75	50-60
Rolling disk cultivator	45-55	40-50
Ridge Till cultivator	20-40	5-25
UNCLASSIFIED MACHINES:		
Anhydrous applicator	75-85	45-70
Anhydrous applicator with closing disks	60-75	30-50
Subsurface manure applicator	60-80	40-60
Rotary Hoe	85-90	80-90
Bedders, listers & hippers	15-30	5-20
Furrow diker	85-95	75-85
Mulch Treader	70-85	60-75

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<u>IMPLEMENT</u> ^{1/}	<u>NON FRAGILE</u>	<u>FRAGILE</u>
IMPLEMENT		
DRILLS:		
Single disk opener drills	85-100	75-85
Double disk opener drills (conventional)	80-100	60-80
No till drills and drills with the following attachments <u>in standing stubble</u> :		
Smooth no till coulters	85-95	70-85
Ripple or bubble coulters	80-85	65-85
Fluted coulters	75-80	60-80
Air seeders: (Refer to appropriate field cultivator or chisel plow depending on the type of ground engaging device used.)		
Air drills: (Refer to corresponding type of drill opener.)		
ROW PLANTERS:		
Conventional planters with:		
Runner openers	85-95	80-90
Staggered double disk openers	90-95	85-95
Double disk openers	85-95	75-95
No till planters with:		
Smooth coulters	85-95	75-95
Ripple Coulters	75-90	70-85
Fluted coulters	65-85	50-80
Strip till planters with:		
2 or 3 Fluted coulters	60-80	50-75
Row cleaning devices	60-80	50-60
(8-14" wide bare strip using brushes, spikes, furrowing, disks, or sweeps)		
Ridge till planter	40-60	20-40

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CLIMATIC EFFECT:	Non-Fragile	Fragile
Over winter weathering.**		
Following summer harvest	70-90	65-85
Following fall harvest	80-95	70-80

****In northern climates with long periods of snow cover and frozen conditions, weathering may reduce residue levels only slightly, while in warmer climates, weathering losses may reduce residue levels significantly.**

FORMULA: Crop Residue Remaining = % residue cover x tillage factors x decomposition rate.

The values in this list can be used to estimate reductions in surface cover that result from one or a series of tillage or other field operations, when they are calculated and expressed as reductions in percent ground cover.

The values in this list should not be used to estimate reductions in surface cover calculated and expressed as changes in mass (pounds of residue per acre).

The information contained in the attachment should be used as the starting point when making judgements of residue burial resulting from field operations.

How To Compute Percent Residue Remaining

To calculate and estimate the percent cover remaining after planting and tilling crop residue first convert crop yield to pounds of residue remaining after harvest. Then using the cross reference chart (pg. 21) convert to percent cover.

For example, a corn yield of 90 bushels per acre produces 5,040 lbs. of corn residue which leaves approximately 82% residue cover. Note corn residue is considered to be non-fragile. To compute the percent cover after planting using the charts multiply the harvest percent cover times the non-fragile overwintering factor to get percent cover before planting. $82\% \times 90\% = 73.8\%$ spring cover.

To estimate the percent cover after no-till drilling soybeans in 7" rows with fluted coulters into this corn residue: multiply $73.8\% \times 90\% = 66.4\%$ corn residue after planting.

To estimate percent cover for a spring chisel/disk operation: multiply 73.8% cover remaining x chiseling factor (50%) x finishing disk factor (70%) or $73.8\% \times (50\%) \times (70\%) = 25.8\%$ corn residue after planting.

CROP ABBREVIATIONS FOR "C" FACTOR FILES AND
CROPS AND CODES FOR CROP SEQUENCES

<u>CODE</u>	<u>CROP</u>
A(x)	Alfalfa (1st yr. 2nd yr.)
AB	Alfalfa/Brome
AM	Amarath
AP	Apples
AS	Asparagus
BR	Barley
BC	Broccoli
BW	Buckwheat
CG	Corn, Grain
CB	Cabbage
CE	Celery
CL	Cauliflower
CH	Cherries
CR	Carrots
CS	Corn Silage
CT	Cotton
CU	Cucumber
CV	Crown Vetch
EB	Dry Edible Bean
DS	Drilled Soybeans
DW	Durum Wheat
FX	Flax
FB	Faba Beans
FS	Forage Sorghum
GL	Gladiolus
GS	Grain Sorghum
HV	Hairy Vetch
KB	Kentucky Bluegrass
LT	Lettuce
LN	Lentils
LU	Lupine
MI	Millet
ML	Mellons
OG	Orchard Grass
RA	Range
OT	Oats
ON	Onions
OR	Orchards

CROP ABBREVIATIONS (Cont.)

<u>CODE</u>	<u>CROP</u>
PA	Peaches
PE	Pears
PC	Popcorn
PE	Pears
PB	Pepper Bell
PF	Peas, Field
PG	Peas, Green
PH	Pepper Hot
PK	Pumpkins
PO	Potato
PS	Pasture
EP	Early Potatoes
LP	Late Potatoes
RP	Rapeseed (canola, mustard crambe)
RS	Raspberries
RY	Rye
RC	Red Clover
RD	Raddish
SU	Sunflower
SA	Safflower
SB	Soybean - Row
SD	Soybean - Drilled
DS	Drilled Soybeans
SC	Sweet Corn
SE	Sweet Clover
SF	Summer Fallow
SG	Sugar Beets
SH	Sweet Potatoes
SN	Snap Beans
SQ	Squash
SP	Spinach
SR	Spring Rye
SS	Sorghum/Sudax Silage
ST	Strawberry
SU	Sun Flower
SW	Spring Wheat
TB	Tobacco
TF	Tall Fescue
TI	Timothy
TM	Tomatoes
TS	Spring Triticale
TW	Winter Triticale

CROP ABBREVIATIONS (Cont.)

CODE CROP

WB	Winter Barley
WR	Winter Rye
WW	Winter Wheat
SS	Sorghum Silage
OS	Oat Silage
BL	Barley with Legume Cover Crop
OL	Oats with Legume Cover Crop
WL	Wheat with Legume Cover Crop
SY	Soybeans with Rye Cover Crop
CR	Corn Silage with Rye Cover Crop
TR	Tomato with Rye Cover Crop
PR	Potato with Rye Cover Crop
CX	Cabbage with Rye Cover Crop
SX	Sunflower with Rye Cover Crop
TX	Tobacco with Rye Cover Crop
SZ	Sweet Corn with Rye Cover Crop
BX	Sugar Beets with Rye Cover Crop
BX	Companion Crop for Meadow or Green Manure
X2	Two Green Manure Crops Same Year