

MARYLAND'S RUSLE2

INSTRUCTIONS AND USER'S GUIDE

April 2017

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Welcome to RUSLE2

Version 2 of the Revised Universal Soil Loss Equation (**RUSLE2**) estimates soil loss from rill and interrill (sheet and rill) erosion caused by rainfall and its associated overland flow. **RUSLE2** uses six factors for climatic erosivity, soil erodibility, slope length, slope steepness, cover-management, and support practices to compute soil loss.

RUSLE2 is a powerful tool for conservation planning, inventorying erosion rates over large areas, and estimating sediment production that might become sediment yield in watersheds. It can be used on cropland, pastureland, rangeland, disturbed forestland, construction sites, mined land, reclaimed land, landfills, military lands, and other areas where surface overland flow occurs because rainfall is greater than infiltration.

About RUSLE2

The structure of the revised universal soil loss equation **RUSLE2** is based on the Universal Soil Loss Equation (USLE), which is given by:

$\mathbf{A} = \mathbf{R} \mathbf{K} \mathbf{L} \mathbf{S} \mathbf{C} \mathbf{P}$

where A = average annual soil loss from rill and interrill erosion caused by rainfall and its associated overland flow (tons ac⁻¹ yr⁻¹), R = the factor for climatic erosivity, K = the factor for soil erodibility measured under a standard condition, L = the factor for slope length, S = the factor for slope steepness, C = the factor for cover-management, and P = the factor for support practices. A value for soil loss A is computed by selecting values for each factor and multiplying them.

RUSLE2 PROGRAM SETUP

Create a RUSLE2 Shortcut Icon for Your Desktop

To create a RUSLE2 Shortcut Icon for your desktop, simply navigate to Start \ All Programs \ USDA Applications \ RUSLE2 \ RUSLE2 Erosion Protection. DO NOT LEFT CLICK, instead right click your mouse and go to "Send to", click desktop (Create Shortcut). This will place a shortcut on your desktop.

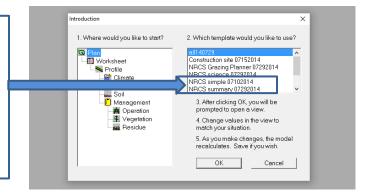
Open the RUSLE2 Program

You can open the RUSLE2 program by clicking on the RUSLE2 icon on the Desktop. Or by clicking on *Start > Programs > USDA Applications > RUSLE2*



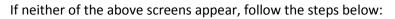
Choosing the correct template

1) This screen should appear when RUSLE2 is first opened. Choose the NRCS simple 07102014 template. You may also choose the NRCS summary 07292014 template to evaluate filter strips. Once you choose this template then simply click OK. This will set your RUSLE2 program to the correct template.



2) This screen may or may not appear. If it does appear, click *Cancel*.

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defaul			
File name: File type:	plans	Upen Cancel	- /



1)	From the toolbar menu, click on Options / Template / Load.	File	RUSLE2 Version 2.5.2.11 (A	Opti	ons Tools Window Help	د <mark>ا کار ا</mark> کار میں	rent	. 🛛 🖬 🕮 (📕 🚰 🔽 Auto upd	date
2)	Choose NRCS simple 07102014.xml or you may choose NRCS summary 07292014.xml. Click open. This will set your computer to the proper template.			« USI	Name all140729 Construction site 07152014 NRCS Grazing Planner 07292014 NRCS simple 07102014 NRCS summary 07292014 NRCS summary 07292014 VA Basic User Template 2012 Nov VA Science User Template 2012 Nov	8 7 8 7 8 8 8 7	Search Users ate modified (21/2014 9:27 AM (17/2014 9:27 AM (21/2014 9:27 AM (21/2014 9:27 AM (21/2014 9:27 AM (21/2014 9:27 AM (21/2014 9:27 AM (16/2014 1:38 PM (16/2014 1:38 PM)	It is a constraint of the cons	ent ent ent ent ent ent ent	
				File na	me	2				

Note: You do not need to set the template again each time you open RUSLE2 unless you wish to change it. Your RULSE2 program will automatically default to the template you choose each time you open the program.

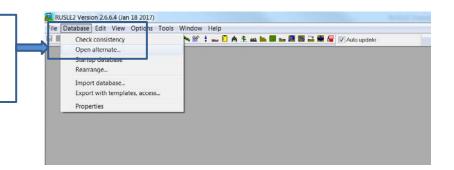
Set your RUSLE2 Program to the Correct Database (FOR NRCS USERS ONLY)

When RUSLE2 is installed on your computer, the program automatically creates and defaults to an empty database located in your C:Drive. This database is called "moses". It is the database which stores all of your RUSLE2 data including crop rotations, managements and RUSLE2 calculations or farm data. For Conservation Planning and using RULSE2 you will need to re-direct the database to another database which is located on your Shared Drive. This will ensure you are working with the most up-to-date information when using RUSLE2 and that your work is saved to the Server each night.

NOTE: It is EXTREMELY IMPORTANT that you use RUSLE2 with the correct database. Failure to use the correct database could result in loss of RUSLE2 field data.

When RUSLE2 was installed on your computer, the program creates and automatically defaults to a "moses" database located on your C: drive. You will need to re-direct this database to your S: shared "county_moses" database. To do this simply complete the following steps:

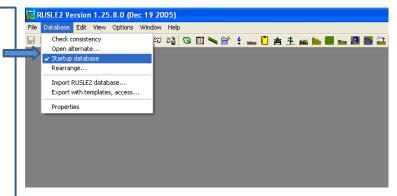
 At the top of the RUSLE2 screen click on Database, then choose Open Alternate. The following screen will appear.



 Click the drop down menu, navigate to your S:Drive and locate your shared "moses" database. Your shared "moses" database is located at S:\NRCS\RUSLE2. In there should be your specific county "moses" database. It should be named county_moses.

**Example: Kent_moses. Click once on your county specific "moses" database and then click "Open". This will re-direct your database to the shared drive. All existing files and information from your county field office that has been completed using RUSLE2 will now be available for your use and information.

- Catabase to open 🕒 💭 🐌 + Network + usdanet + nrcs + SHARED + MDCHE + NRCS + RUSLE2 + + ++ Se II · 🔟 0 Organize • New fol Favorites Date modified Type E Desktop - archives 3/5/2017 3-17 PM File foirte Database_Updates In Downloads File folde 3/6/2017 2:53 PM 25 Recent Places L MD Climate Data 10-12 3/6/2017 2:39 PM File folder MD_Crop_Data_10-12 3/6/2017 3:36 PM File folde 3/6/2017 2:45 PM 4/13/2017 8:18 AM GDB File 30,954 KB Comput 1 OS (C) MDAN2 () USDA NE Thristy.Brown (\\ INDAN2 (\\USDA.NE K Network es (*.gd * Cancel
- 3) Set the shared "moses" database to always open to this database. To do this, simply go to menu toolbar and click on Database. Next, choose Startup Database. Click once on this and it will place a check to the left of Startup Database. This will ensure each time you boot up RUSLE2, you go to the correct shared "county_moses" database.



NOTE: Once you complete the above steps, there is no need to continue with the following steps for downloading and importing database sets. All Climate, Soils, and CMZ (Crop Management Zone) data sets are available on the County's shared drive. You many go directly to RUSLE2 Introduction on pages 13 through 28.

USLE2 Version 2.6.6.4 (Jan 18 2017)

If you do not have an S: drive, shared "moses" database, you will need to complete the following steps to download and import the database sets.

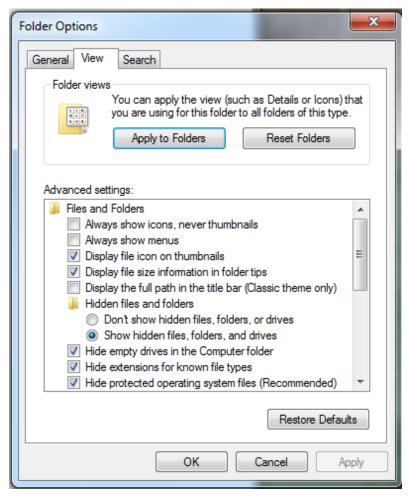
Downloading RUSLE2 Databases

RUSEL2 Folder/Data Location

The RUSLE2 program itself is kept at *Computer* > *LocalDisk* (*C*:) > *Program Files* (*x*86) > *USDA* > *Rusle2* > *NRCS*, however, the data for the program is kept at *Computer* > *LocalDisk* (*C*:) > *ProgramData* > *USDA* > *RUSLE2* > *NRCS*. The *ProgramData* folder is a hidden folder and may not be seen on all computers until the view is setup correctly.

To unhide hidden folders:

- 1) Open the windows explorer and click on the "Organize" button at the top of the screen
- 2) Select "Folder and Search Options" from the menu.
- 3) The folder options screen will appear. Click on the middle tab that says "View"
- 4) The radio button that says "Show hidden files, folders, and drives" needs to be selected
- 5) Click "OK" and you will then be able to see the *ProgramData* file the next time windows explorer is opened

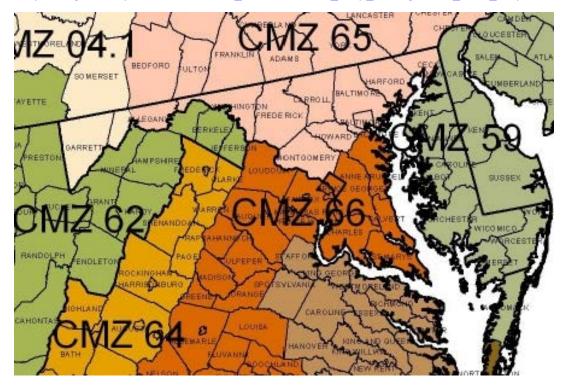


Download Base Database and Database Updates - NRCS USERS CAN SKIP THIS SECTION

- From the RUSLE2 website, navigate to Base Database & Misc Files > Download Files > Latest Base Database and Updates
 <u>http://fargo.nserl.purdue.edu/RUSLE2_ftp/NRCS_Base_Database/Latest%20Base%20Database%20and%20_Updates/</u>
- 2) Click on "NRCS Moses Updates 030104 to 01292015.zip"
- 3) A pop-up will appear at the bottom of the screen. Click on the arrow next to the "Save" button and "Save As" *Computer > LocalDisk (C:) > ProgramData > USDA > RUSLE2 > NRCS > Import*

Download Crop Management Zone (CMZ) Database - NRCS USERS CAN SKIP THIS SECTION

1) Determine which CMZ database you will need to import. The CMZ maps can be found here: <u>http://fargo.nserl.purdue.edu/rusle2_dataweb/NRCS_Crop_Management_Zone_Maps.htm</u>.



- 2) From the RUSLE2 website, navigate to Crop Management Templates > Data Files http://fargo.nserl.purdue.edu/RUSLE2 ftp/Crop Management Templates/
- 3) Click on the data files for the needed CMZ (CMZ 59, CMZ 66, CMZ65, or CMZ 04.1)
- 4) A pop-up will appear at the bottom of the screen. Click on the arrow next to the "Save" button and "Save As" *Computer > LocalDisk (C:) > ProgramData > USDA > RUSLE2 > NRCS > Import*
- 5) Save all needed to the same location

Download Soils Data - NRCS USERS CAN SKIP THIS SECTION

- 1) From the RUSLE2 website, navigate to *Soils Data > Data Files* <u>http://fargo.nserl.purdue.edu/rusle2_dataweb/NRCS_Soils_Data_Files.htm</u>_
- 2) Navigate to the Maryland folder

To Download Soils for Individual Counties:

1) Right click on the county (ex. "Carroll County, Maryland.gdb") and click "Save Target As" Computer > LocalDisk (C:) > ProgramData > USDA > RUSLE2 > NRCS > Import

Download Climate Data - NRCS USERS CAN SKIP THIS SECTION

- 1) From the RUSLE2 website, navigate to *Climate Data > Data Files* _http://fargo.nserl.purdue.edu/RUSLE2_ftp/Climate_data/_
- 2) Click on "MD_clime042403.zip"
- 3) A pop-up will appear at the bottom of the screen. Click on the arrow next to the "Save" button and "Save As" Computer > LocalDisk (C:) > ProgramData > USDA > RUSLE2 > NRCS > Import

Importing Files

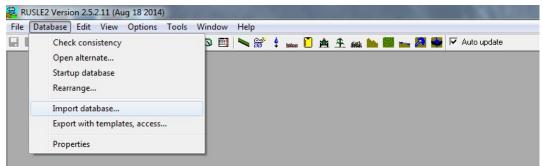
NRCS USERS CAN SKIP THIS SECTION

Extracting Files

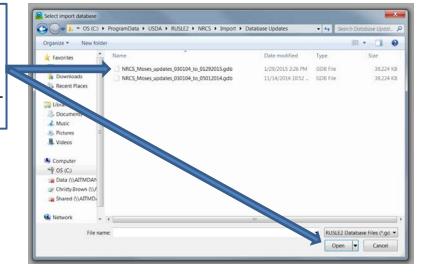
- Once all of the data files have been downloaded, Open windows explorer and navigate to the same location: Computer > LocalDisk (C:) > ProgramData > USDA > RUSLE2 > NRCS > Import
- 2) Right click on the downloaded CMZ file
- 3) Hoover over "WinZip" and click on "Extract to here" when the submenu appears
- 4) Repeat this steps 2 and 3 for every zip imported zip file (Note: If county soil files are in .gdb format, they are already unzipped)
- 5) Once all of the files have been unzipped and saved to the import folder, open the RUSLE2 program

Base Database Update

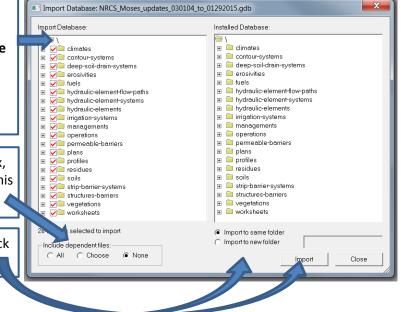
1) Click on "Database" and "Import Database..."



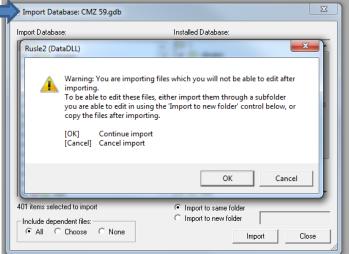
 A new screen titled Select import database will appear with all of the available databases to import. Choose
 NRCS_Moses_updates_030101_to_ 01292015.gdb. Click open.



- Click on the top left folder. This will automatically check all of the folders.
 When importing a new master database or a master database update, it is important to click on the top left folder that will populate each folder with the appropriate files.
- 4) Under the "Include dependent files" box, "All" checked at the default. You want this to be checked as "None"
- Click on "Import to same folder" and click the "Import" button

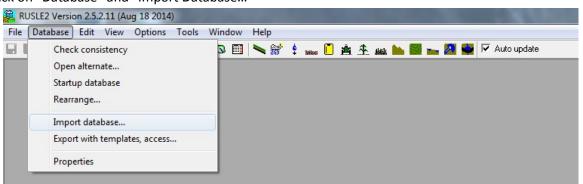


6) A warning message will appear. Click "OK"
7) The database import will then run through a series of windows while the program downloads the files. Click "OK" when the import complete box pops up and click "OK" when a window appears saying the import has finished.



Crop Management Zones (CMZ), Soils, and Climate

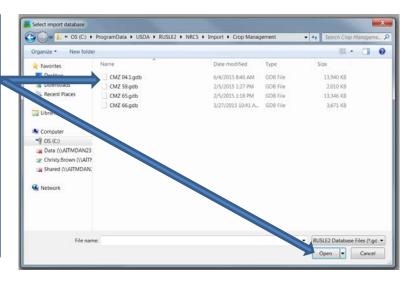
1) Click on "Database" and "Import Database..."

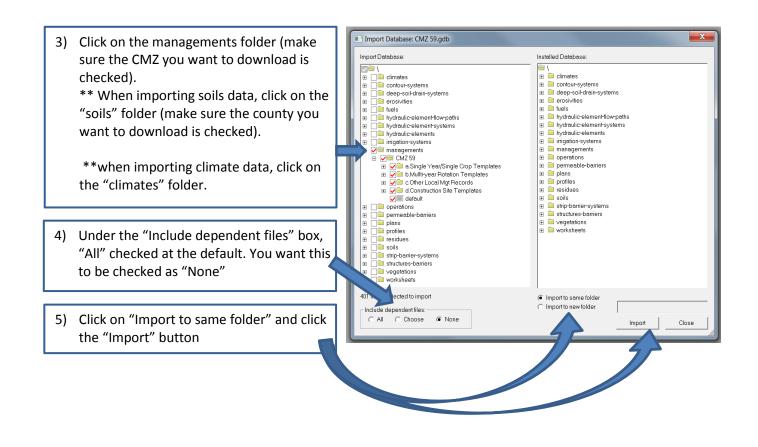


 A new screen titled Select import database will appear with all of the available databases to import. Click the crop management zone (CMZ) you want to download. Click open.

** Soils - Choose the county and click open.

** Climate – Choose "MD clime042403.gdb" and click open.





Import Database: CMZ 59.gdb 6) A warning message will appear. Click "OK" Import Database: Installed Database 7) The database import will then run X Rusle2 (DataDLL) through a series of windows while Warning: You are importing files which you will not be able to edit after the program downloads the files. importing. To be able to edit these files, either import them through a subfolder Click "OK" when the import you are able to edit in using the 'Import to new folder' control below, or copy the files after importing. complete box pops up and click [OK] Continue import "OK" when a window appears saying [Cancel] Cancel import the import has finished. ОК Cancel 401 items selected to impor Import to same folde C Import to new folder Include dependent files:

C Choose C None

🖸 All

Close

Import

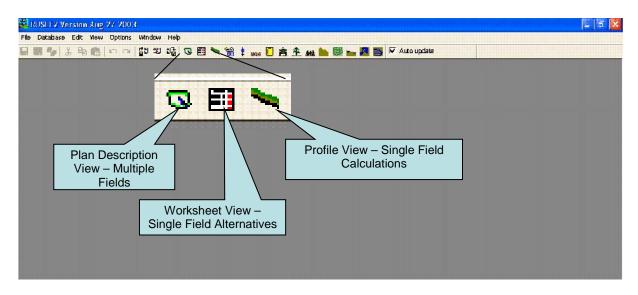
RUSLE2 INTRODUCTION

Program Feature Icons

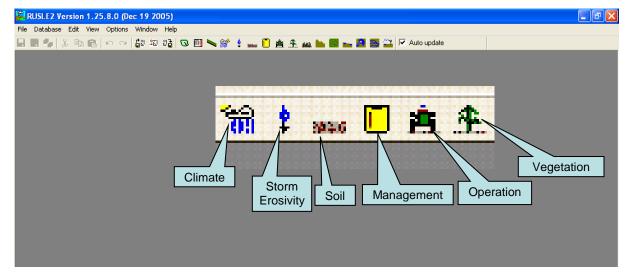
<u>Plan Description View</u> – (Green Watershed Icon) This is the template to use to calculate soil loss for *multiple fields*. These calculations can be made for single systems or multiple alternatives. Use this view for whole farm conservation planning.

<u>Field Worksheet View</u> – (Data Sheet) This is the template to use to calculate soil loss alternatives for *one field or one slope*.

<u>Profile View</u> – (Green Sloping Line) This is the template for calculating soil loss for *one slope or one field*. Can only be used for single systems.



These icons below contain specific information for use when developing RUSLE2 crop rotations for soil loss calculations. Before use of these below, be sure to have had basic RUSLE2 training. Failure to do this may result in loss of data.



Climate

The climate object describes the weather information for the site. The information in this object includes data on annual erosivity, 10 yr El storm, average monthly temperature, and average monthly precipitation. Information is cataloged in the database according to names of locations.

Storm Erosivity

Storm erosivity varies through the year depending on location. The information in the storm erosivity object describes how erosivity varies during the year as a function of zones or regions. Information is cataloged in the database according to a zone number.

Soil

The soil object includes information on soil erodibility, soil texture, hydrologic soil group, and rock cover. Also, this object includes the soil erodibility to compute a value for the soil erodibility factor if one is not available. Information is cataloged in the database according to a soil name, which could be a soil-mapping unit from an NRCS soil survey.

Management

The management object contains information on management practices. Each practice typically includes a list of dates and the operations, vegetation, and applied materials like mulch and manure associated with each date. Information is cataloged in the database according to a management name chosen by the user.

Operation

The operation object contains the information used to describe operations. A key component of the information used to describe an operation is processes including begin growth, kill vegetation, flatten standing residue, disturb surface, remove surface cover, and remove live biomass. Information is cataloged in the database according to an operation name chosen by the user.

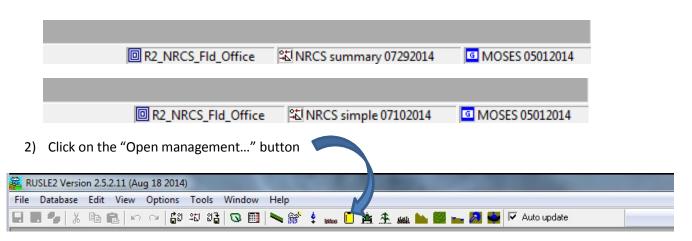
Vegetation

The vegetation object contains the information used to describe live vegetation. This information includes a name for the residue to associate with the vegetation and data on yield, the relationship of above ground biomass to yield, how the vegetation slow runoff, and temporally varying values on root biomass, canopy cover, fall height, and live ground cover. Information is cataloged in the database according to a vegetation name chosen by the user.

Creating a RUSLE2 Rotation

1) Before opening the managements button, make sure the screen template is set at *NRCS simple* 07102014 or

NRCS summary 07292014



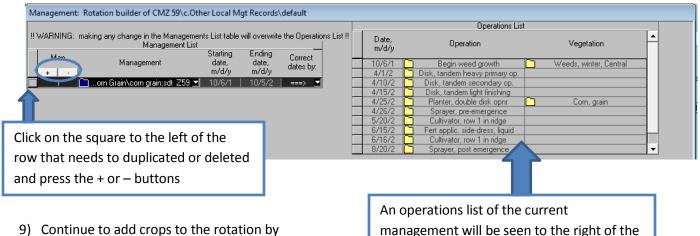
3) To create a new rotation, click on the default file when the *Open* screen pops up

4) When the default screen opens, click on "Open" folder button to the right of "View/edit rotation builder used to make this management" Wanagement: CMZ 59\c.Other Local Mgt Records\default Interpret to make new one Open Fuel for all operation builder used to make this management to make new one Open Fuel for all operation Base equiv. dise Base energy Base fuel	ed as a D ons esel us gyuse
--	---

- 5) A new screen will appear that will allow you to build a base rotation using templates that can be edited to meet the exact rotation that is being used on the operation. The rotation to be used in this example is 2 years corn, tandem disc with coiled tine harrow, 1 year no-tilled wheat with no-tilled rye cover crop, 1 year soybeans, tandem disc with coiled tine harrow.
- 6) To create this rotation, add the first crop in the rotation by clicking on the down arrow under the "Management" column.

Managemen	t: Rotation builder of CMZ 59\c.	Other Local M	gt Records'	default					
							Operations L	.ist	
II WARNING:	making any change in the Manage : Management I	_ist		e the Operations I	_ist II	Date, m/d/v	Operation	Vegetation	
Man.	Management	Starting date, m/d/y	Ending date, m/d/y	Correct dates by:		1/1/0	default	default	
1	(none)	1/1/0	1/1/0	rs to fit 💌					
Apply A	(none) CMZ 59 Corn Grain Corn Grain Corn grain/cswp 2 Corn grain/fcswp 2 Corn gr	9 59 259 59 59							

- 7) From the drop down menu, select the CMZ that you the rotation will be used in (CMZ59 in this example) > a. Single Year/Single Crop Templates > Corn Grain > corn grain;sdos
- 8) Crops can be added or deleted by highlighting the row and hitting the + or buttons. If a row is highlighted and the + button is hit, another year of that same crop and management will be added below the highlighted row.



- Continue to add crops to the rotation by choosing the crops and management from the dropdown box
- Once all of the crops in the rotation have been added, click the "Apply/Close" button at the bottom of the rotation builder screen

An operations list of the current management will be seen to the right of the rotation builder, as more crops are added, the Operations List will adjust so you can view the management template before editing

RNING:	making any change in the Managemen Management List	nts List table	will overwrite	the Opera	ations List !!	Date,		Operation		Vegetation	^
Man.		Starting	Ending	Correct	- !	m/d/y		•		-	
indin.	Management	date,	date,	dates by		10/6/1		Begin weed growth		Weeds, winter, Central	
-		m/d/y	m/d/y	00(00 0)	· [4/1/2	\Box	Disk, tandem heavy primary op.			
1	🦰orn Grain\corn grain;sdt Z59 💌	10/6/1	10/5/2	===>	-	4/10/2	\Box	Disk, tandem secondary op.			
2	🦰orn Grain\corn grain;sdt Z59 💌	10/6/2	10/5/3	===>	-	4/15/2	\Box	Disk, tandem light finishing			
3	🦳ll grain/wheat w, grain; nt z59 💌	10/12/3	7/3/4	===>	-	4/25/2	\Box	Planter, double disk opnr	\cap	Corn, grain	
4	🦳inter cover crops\rye; fnt z59 💌	10/22/4	3/15/5	===>	-	4/26/2	n	Sprayer, pre-emergence			
5	🦳 Row\soybeans; nr, sdt, Z59 🗾	10/17/5	10/14/6	===>	-	5/20/2	$\overline{\Box}$	Cultivator, row 1 in ridge			
					-	6/15/2	П	Fert applic, side-dress, liquid			
					ĺ	6/16/2	n	Cultivator, row 1 in ridge			
					i	8/20/2	n	Sprayer, post emergence			I

11) The rotation builder will close and a management screen will appear with the chosen crops and managements. From this screen, add or delete rows to make the rotation as close as possible to the actual management on the operation.

Graphic Rel. row grade, % 10 Add to this m View/edit rotation builder u	O Nom nanagement to make new one Open sed to make this management open Base Base	term natural rough., mm 6.0 nally used as a rotation? Yes Duration, yr 6 operations (none) ▼ quiv. diesel use, gal/ac 17.0 e energy use , BTU/ac 2400000	Management	How set crop year Crop Year	end/start? STIR Values Crop	Avg. annual STIR set by user Start da m/d/	te, End date,
Irrigation system	no irigation 🛛 👻	Base fuel cost, US\$/ac 0	1 2 3 4 5	120 Co 0.15 Weeds, v 120 Co	winter, Central m, grain winter, Central m, grain winter 7in rows	10/15. 4/2// 10/6/ 4/2// 10/6/	2 10/5/2 2 4/1/3 3 10/5/3
Operations Info		Management Opera	ations				
Date, m/d/y End/Start crop year?	Operation	Vegetation	Yield (harv. units), #/ac	Type of cover material		Cover from addition, % Standir by op desc. b/ad	ed Fuel used this operation
10/6/1 ▼ No 4/1/2 ▼ Yes	Begin weed growth Disk, tandem heavy primary op.	▼	1120		870	28 0	default default
4/10/2 ▼ No 4/15/2 ▼ No 4/25/2 ▼ No 5/20/2 ▼ No 5/20/2 ▼ No	Disk, tandem secondav op. Disk, tandem light finishing Planter, double disk opn Cutivator, row 1 in ridge	Corn, grain	⊻ 125				default default default default default
6/15/2 ▼ No 6/16/2 ▼ No 8/20/2 ▼ No	Fert apolic_side-dress, liquid Cultivator, row 1 in ridge Sprayer, post emergence			weeds; 0-3 mo	▼ 250	14	default default default
10/5/2 ▼ Yes 10/6/2 ▼ No 4/1/3 ▼ Yes 4/10/3 ▼ No	Harvest, killing crop 50pct standing stubble Begin weed growth Disk, tandem heavy primary op. Disk, tandem secondary op.	▼ ▼	± 1120		3100 870	70 3500 28 0	default default default default
4/15/3 ▼ No 4/25/3 ▼ No 5/20/3 ▼ No 5/20/3 ▼ No 6/16/3 ▼ No	Disk, tandem licht finishing Planter, double disk opn Sonauer, roewencence Cultivator, row 1 in ridge Fert annie, side-dress, limid Cultivator, row 1 in ridge	Corn, grain	125				default default default default default default
							default 🔽 🗸
(RUSLE2 auto	nake: Producer only disc omatically populated thr ator is not used, harrow	ee					
Graphic Rel. row grade, % 100 Add to this ma	Anagement to make new one Open ed to make this management open Base eq Base	erm natural rough., mm 6.0 ally used as a rotation? Yes Duration, yr 6	Management S1	TIR 280 How set crop year er Crop Year STI TIR Cr	id/start? R Values	Avg. annual STIR set by user Start date, m/d/y	47 Find date, m/d/y
Operations Info							
Date, m/d/y End/Start +	Operation	Management Operati Vegetation	Yield (harv. units), #/ac	Type of cover material		Standing res. added ddition, % desc., lb/ac	Fuel used this operation
10/6/1 ▼ No 4/1/2 ▼ No 4/10/2 ▼ No	Begin weed growth Disk, tandem heavy primary op. Disk, tandem secondary op.	Weeds, winter, Central	⊻ 1120		870	28 0	default
4/15/2 ▼ No 4/25/2 ▼ No 4/26/2 ▼ No 6/15/2 ▼ No	Harrow, coiled tine Planter, double disk opnr Sprayer, pre-emergence Fert applic, side-dress, liquid	Corn, grain	▲ 125				default ▼ default ▼ default ▼ default ▼
8/20/2 ▼ No 10/5/2 ▼ No 10/6/2 ▼ No 4/1/3 ▼ No 4/1/3 ▼ No	Sprayer, post emergence Harvest, killing crop 50pct standing stubble Begin weed growth Disk, tandem heavy primary op. Disk, tandem secondary op.	C Weeds, winter, Central	<u>✓</u> 1120	weeds; 0-3 mo 💆	250 3500 870	14 73 3500 28 0	default default default default default
4/15/3 ▼ No 4/25/3 ▼ No 4/26/3 ▼ No 6/15/3 ▼ No	Harrow, coiled tine Planter, double disk opnr Sprayer, pre-emergence Fert applic, side-dress, liquid	Corn, grain	125				default default default default
8/20/3 ▼ No 10/5/3 ▼ No 10/12/3 ▼ No	Sprayer, post emergence Harvest, killing crop 50pct standing stubble Fert applic, surface broadcast			weeds; 0-3 mo 💆	250 3500	14 73 3500	default default default
10/13/3 No	Drill or air seeder single disk openers 7-10 in spac.	Wheat, winter 7in rows	▼ 50.0				default 🔽 💌

Manageme	ent: CM7 50	\c.Other Local Mgt Records\2 yrs corn, grain, sdt; wh	est nt n/e co	nt: southeans, sdt:250										
	Graphia I		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	, nc soybeans, suc.209										
Rel. rov		erage STIR value is displayed as w				Manageme	ent STIR				Avg. ann		47	
	Voar ST	TIR values. Only the average will h	a dicala	ved in the				How set crop ye Crop Year			set	by user	<u> </u>	
View/ec	ieal Si	in values. Only the average will a	Je uispia	yeu in the								Start date.	End date.	
viewreu	workst	neet view, but refer to the Crop Y	ear STIR	values to		Crop year	STIF	}	Cro	p		m/d/y	m/d/y	
Irrigat	WOIKSI	leet view, but refer to the crop r		Values to		1	90	Weeds, winte	er Cei	ntral+Corn	orain	10/15/0	10/5/2	
mga	make s	ure you are meeting the standar	d if nlanı	ning		2	90	Weeds, winte				10/6/2	10/5/3	
	make 3	are you are meeting the standar			v H	3	2.9			er 7in rows	31001	10/6/3	7/3/4	
	329/34	5				4	97	Weeds, winter, Ce	entral+	Soybean, r	nw 7in rows	7/4/4	10/14/6	
	525757	J.			_									
erations In	nfo													
				Management Op	erations							_		
. .												Standing		▲
Date,	End/Start					Yield (harv.				Cover math	Cover from	res, added		
m/d/y	crop year?	Operation		Vegetation		units), #/ac		Type of cover material		add/remov e.lb/ac	addition, %	by op. desc.,	Fuel used this ope	eration
										e, ib/ac		desc., Ib/ac		
+ •												iu/ac		
4/25/3 💌	No [Planter, double disk opnr		Corn, grain	-	125							default	
4/26/3 💌	No [Sprayer, pre-emergence	-										default	
6/15/3 -	No (Fert applic, side-dress, liquid	-				<u>~</u>	0.0.0	_	250	14		default	
8/20/3 <u>-</u> 10/5/3 -	No Ves	Sprayer, post emergence	-					weeds; 0-3 mo	-	250 3500	14 73	3500	default default	
10/5/3 •	No No	Harvest, killing crop 50pct standing stubble Fert applic, surface broadcast	-							3000	13	3000	derauit default	
10/12/3		Drill or air seeder single disk openers 7-10 in spac.	÷_	Wheat, winter 7in rows	-	50.0							default	
3/3/4 🔻	No No	Sprayer, post emergence and fert, tank mix		wheat, white 7h tows	•	30.0	<u></u>	weeds: 0-3 mo	-	250	14		default	
7/3/4 -	Yes	Harvest, killing crop 50pct standing stubble	-					weeds, 0-5 mo	-	2500	77	2500	default	
10/22/4 -	No	Drill or air seeder single disk openers 7-10 in spac.	÷ 👝	Rye, winter cover	-	2240			_	2000		2300	default	÷
3/15/5 -	No	Spraver, kill crop		riye, winter cover		2240			-	25	1.5	480	default	÷
10/17/5 -	No	Begin weed growth	÷ 🗅	Weeds, winter, Central	*	1120			-	2.5	1.5	400	default	÷
5/1/6 -	No	Disk, tandem heavy primary op.	-	Woods, Wilkor, Corkia		1120			_	1000	32	n	default	
5/5/6 -	No	Disk, tandem redvy printaly op.	-							1000	02		default	
5/10/6 -	No	Disk, tandem light finishing	-										default	
5/15/6 -	No	Drill or air seeder single disk openers 7-10 in spac.	T	Soybean, mw 7in rows	-	30.0							default	
5/16/6 -	No L	Sprayer, pre-emergence	-	1,200,000	_	00.0							default	
6/15/6 -	No C	Sprayer, post emergence	-				\cap	weeds; 0-3 mo	-	250	14		default	-
7/1/6 -	No	Sprayer, insecticide post emergence	-										default	
	Yes	Harvest, killing crop 50pct standing stubble	-							520	26	520	default	T T
10/14/6 🔻														

Double check the crop intervals so they are marked correctly. "YES" should be marked next to the operations where a harvest occurs. Many single year management templates will include weed growth. The program will most often recognize weed growth and cover crops and their own crop, which will need to be corrected. A crop interval is defined as the interval between the harvest of the previous crop to the harvest of the current crop. 13) Save your crop management template. Go to *File > Save As > CMZx > c. Other Local Mgt Records.* You will know if the changes in the template you are working on have been saved or not by the presence of a * at the end of the file name in the heading of the management view. Once the changes have been saved the * will disappear.

Creating a Plan in RUSLE2 – applying the crop rotation and calculating soil loss

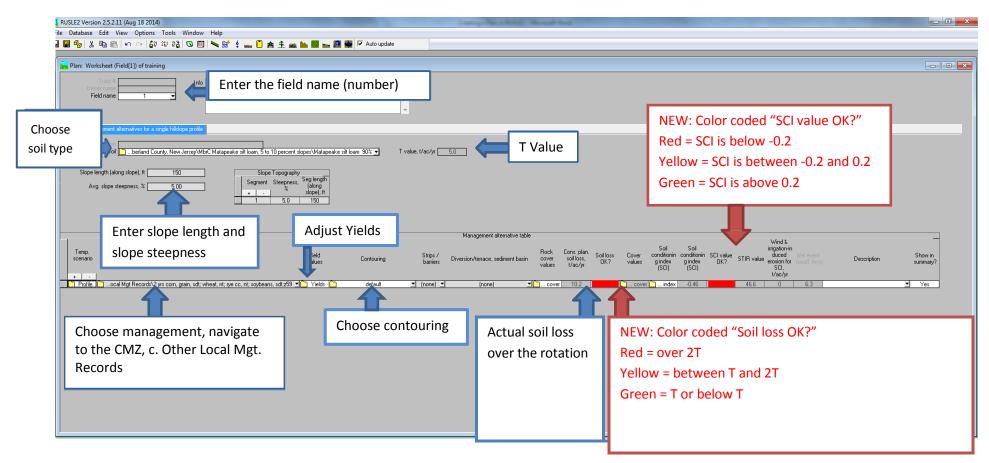
1) Before opening the plan view, make sure the screen template is set at NRCS simple 07102014 or NRCS summary 07292014

	R2_NRCS_FId_O	ffice 🔛 NRCS s	ummary 0729201	4 🛛 🖸 MOSES 05012	2014
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- 3) Any existing plans will appear in the screen. If you want to edit an existing plan, you can do so from here. If you would like to begin with a new plan, click on default (or county specific default, if one was created)
- 4) Enter the basic information needed to identify the plan. In the "Info" box, can type the description of the fields or treatment being evaluated.

📻 Plan:	Contraction	default	T T	Info		A •
Compare	e field alternatives Compute avg.	soil loss for a field/watershed				
	List of fields	Г		Selected	d alternatives for fields	
	Field Field name		Field name	Description	Cons. plan. soil loss, t/ac/yr	Sed. delivery, t/ac/yr
			number**		47	47
5)	Click and open the	e folder to the right	t of the worksh	eet you want to work on		

- 6) Enter information within the worksheet
 - a. Enter the field name/number
 - b. Choose the soil type
 - c. Enter the slope length and steepness
 - choose management. If choosing a crop management template that was created, navigate to the correct CMZ file > c. Other Local Mgt Records > and choose the existing or planned management. Can also choose an existing management located in a. Single Year/Single Crop Templates or b. Multi-year Rotation Templates
 - e. Choose contouring The row grade is the percent of grade off the contour. (e.g. Absolute row grade-1% means the contouring is actually on a 1% grade across the slope)
 - f. Yields To adjust crop yields, click the yellow folder next to "Yields". Another box will open, type in the desired yield for each crop and then click the red X to close the box.



7) Compare the T value with the Cons. plan soil loss t/ac/yr. The bar next to this number will toggle from green to yellow to red, with red indicating the management did not meet the tolerable soil loss.

- 8) Look at the SCI value. If this value is under 0.0, the producer is depleting the soil organic matter faster than it can be rebuilt. The bar next to the SCI will toggle from green to yellow to red depending on the value.
- 9) To add a new scenario to this field's worksheet, press the + button to add a new row. Any information from the top row will be automatically copied to the row below when the + button is used.

Incorporating Manure into Crop Management File

RUSLE2 describes the effect of manure additions to soil by considering how much biomass is incorporated and how much is left on the surface. The solids of the material left on the surface are treated as ground cover subject to decay. The organic material incorporated is treated like incorporation of crop residue and is subject to decay. Knifing manure into the soil is treating as a soil disturbance that is described in the same way that a tillage operation is described.

Manure is treated as a residue in RUSLE2, and values for the properties for manure are entered in the residue database. Add manure to a crop rotation in the management screen of RUSLE2 (see illustration below). Enter the manure operation in the operations section, then choose the type of manure under **"Type of Cover Material"**. Next, open the Type of Cover Material choice (click yellow folder next to residue type) and choose the correct amount of residue applied. Amounts are listed by coverage vs. mass.

												-
gement: CMZ 59\b.Muliti-	year Rotation Tem	plates\Multi-year grain cr	op rotations\comgrain.manp.sc	strye cover, fdtsoy	ybeans.nr.nt z5	9						
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			Fuel for all operations	detault 🚽				Crop Year STIR Values		en rout ops	*1	
		this management Cop	Base equiv. diosel use Base energy use , I Base fuel cost U	3TU/ac 1100000	755	Crop year		Drop	Start date, m/d/y	End date, m/d/y	STIR	200
angeion eyelem	no imga	100 1	Dave last cost o	ostari o l	2020		Con	n, arðin	10/15/1	9/17/2	65	
imgation system no inigation 🚽					100	2		infor cover	9/18/2	4/24/3	42	
						3	Sovbean	mw 7m rows	4/25/3	18/14/3	2.9	
ns linfo.					نــــــ Management Op	perations					<u>.</u>	
					Management Op	perations				Covermat		
ns Info	End/Start crop year?		Operation		Management Op Veget		Yield (harv units), #/oc		ienal	Cover matt add/remove lb/ac	Cover from addition, 3	8
	crop year?	D Monure spr	Operation							add/remove		
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Date. m/d/y 3/20/2 4/25/2 4/25/2	Crop year?	C Plant	eader, solid and semi-solid ler, double disk opnr syer, pre-emergence	2	Vegot	tation	units), #/oc	Type of cover met		add/remove lb/ac 1008.0	6.9	8
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Date. m/d/y 3/20/2 4/25/2 4/25/2 9/17/2 10/10/2 10/10/2	No No No Ves No No No No	Plant Plant Spra Harvest killing Disk ten Dill or eir seeder	eader, solid and semi-solid er, double disk opnr yer, pre-emergence g roop S0pct standing stubble idem heavy primary op. single disk opensis 7-10 in spac.	2	Vegot	tation grain	units), #/oc	Type of cover met		add/remove lb/ac 1008.0	6.9	8
Date. m/dly 3/20/2 4/25/2 4/25/2 9/17/2 10/10/2 10/10/2 10/10/2	No No Yes No Yes	Plent Spre Harvest killing Disk tan Dnill or eir seeder	eeder, solid end semi-solid er, double disk opnr yer, pra-emergence g crop 50pct standing stubble dem heevy primary op. single disk openers 7-10 in spac. Spreyer, kill crop	2	Vegot Corn.	tation grain	units), #/oc	Type of cover met		add/remove lb/ec 1000.0 3470.6	6.9	8
Date. m/d/y 3/20/2 4/25/2 4/25/2 9/17/2 10/10/2 10/10/2	No No No Ves No Yes No Yes No	Plant Spra Harvest killing Disk tan Disk tan Disk tan Fert op	eader, solid and semi-solid er, double das oprir yer, prie-emergence groe 50pc standing stubble dem heavy primery op. single disk openers 7-10 in spoc. Spreyer, kill crop ic: suffice Broadcast	2	Veget Com Ryle, wint	ation grain ter cover	units), #/oc	Type of cover mat		add/remove lb/ec 1000.0 3470.6 522.82	6.9	8
Dets. m/dy 3/20/2 4/25/2 4/25/2 9/17/2 10/10/2 10/10/2 4/24/3	No No No Ves No Yes No Yes No	Plant Spra Harvest killing Dill or air seeder Spra Dill or air seeder Dill or air seeder Spra	eeder, solid end semi-solid er, double disk opnr yer, pra-emergence g crop 50pct standing stubble dem heevy primary op. single disk openers 7-10 in spac. Spreyer, kill crop		Vegot Corn.	ation grain ter cover	units).#/ac	Type of cover mat		add/remove lb/ec 1000.0 3470.6	6.9	8

When manure application is included in the operation of the Crop Management File you will need to include the manure operation. When you select the manure operation in RUSLE2 a dialog box will appear to the right of the operation that requires you to include the type of manure that you are applying.

RUSLE2 requires that inputs for the amount of manure added to a field be input as mass/ac dry weight. A method to convert the fresh or wet weights of manure to dry weight is shown below.

Laboratory data should be used in lieu of these conversion methods where available. Moisture content estimates are also available in the Agricultural Waste Management Handbook for various manure classes.

Equations to Convert to Pounds Dry Matter

(A) For liquids and slurries

(gals /ac) X (8.34 lbs/gal) X (% solids as a decimal) = lbs dry matter

Sample calculations:

(10,000 gal /ac) X (8.34 lbs/gal) X (0.02) = 1668 lbs/ac dry matter RUSLE2 Conversion: 1668 lbs/ac dry matter X 0.5 = 834 lbs/ac

(B) For semi-solids

(lbs /ac) X (% semi-solids as a decimal) = lbs dry matter

Sample calculations: (8000 lbs /ac) X (0.15) = 1200 lbs/ac dry matter RUSLE2 Conversion: 1200 lbs/ac dry matter X 0.5 = 600 lbs/ac

(C) For solids

(lbs /ac) X (% solids or semi-solids as a decimal) = lbs dry matter

Sample calculation: (8000 lbs /ac) X (0.55) = 4400 lbs/ac dry matter

Recommendations for Types of Manure in RUSLE2 Database:

- Manure, liquid (swine from confinement, holding ponds and municipal sewage): Use Equation A
- Manure, semi-solids (includes beef, swine and dairy settling basin): Use Equation A
- Manure, open lots (beef, swine, dairy manure from open lots and buildings and poultry manure): Use Equation B
- Manure, solids or with bedding (horse, sheep packs including straw and shredded newspaper): Use Equation C

Irrigation

RUSLE2 cannot be used to compute soil loss from surface irrigation, but it can be applied to surface irrigated land to compute soil loss from natural rainfall. Since irrigation leaves the soils wetter and thus produces more runoff from natural rainfall than without irrigation, the permeability code in the soil erodibility nomograph can be adjusted one step to a less permeable soil. However, in climates where little rainfall occurs during the irrigation season, this adjustment is unnecessary.

The other consideration given to surface irrigated land is that these lands are frequently graded to produce long gentle slopes. Slope lengths for these fields can be much longer than slope lengths on similar fields that have not been graded.

There are three ways to enter irrigation. Rate, Depth and Monthly. All values are entered in the <u>Management Screen</u>. See below for each.

Enter irrigation application by rate

To enter the irrigation application by rate, you will need to choose the amount of irrigation in inches on a per day basis.

Enter irrigation application by Depth

By entering the irrigation application by Depth, you can bracket the irrigation period. See example below.

Enter irrigation application by Month

This method allows the user to enter the total amount of irrigation for the crop in inches on a month to month basis. See below.

1) Click the drop down menu and .ong-term natural rough., in. 0.24 choose the correct method of illy used as a ro application (Application rate, ient 🗋 open enter application application depth, or monthly plication rate of CMZ 65\c.Other Local Met Re ed Farmer (sprin application depth) Cover from addition, % Date m/d/u Date, m/d/ 2) Click the yellow folder. 19 Application Rate: enter date of tandem light fir application and amount of water 91 applied (inches). Note: click the + sign for additional dates Application Depth: enter Apply A ancel irrigation amount (inches) by period. Monthly Application Depth: enter irrigation amount (inches)

by month for each crop.

Strips/Barriers

(Fie	Plan: Profile (Temp. scenario[1]) of default				
erna	STEP 1: Choose location to set climate:	Location			
Tra d na	STEP 2: Choose soil type:	Soil]	
	STEP 3: Set slope topography:	Slope length (along slope), ft	Avg. slope steepness, %		
	STEP 4a: Select base management: E	Base management 🗋	default	•	
it al	STEP 4b: Modify/build man. sequence if desired:	Rotation builder			
008	STEP 4c: adjust management inputs if desired:	Adjust yields 📋 open	Adjust ext. res. additions 📋 open 🛛 🛛 Rock (cover, % 0	
elen vg.s	Equiv. die	Fuel type for entire run (none) ◀ gy use for entire simulation, BTU/ac000 ssel use for entire simulation, gal/ac 1.0 lel cost for entire simulation, US\$/ac 4.7	Adjust res. buriel level Normel n	es. burial 🚽	
now	STEP 5: Set supporting practices:	default	Relative row grade, % 100	Crit. slope length, ft 120	4
nme	Strips/barrie		(none)		String /Dorriors
	Diversion/terrace, sediment b sin		(none)		Strips/Barriers
Yes	Subsurface drainage	(none)			
	Results Additional Results Track Biomass				
	Soil loss for cons. plan, t/ac/yr 47	Info			*
	Soil loss for cons. plan OK?				-

Select the correct strip cropping choice:

Unless your slope length is longer than 200 feet, you probably only have (2) strips on the "Length" (L).

In the choices 2 Strip rotational 0-1 means: 2 strips on the "L" and the 0-1 means the 1st and 2nd crop in the rotation are next to each other (this would be a two year rotation).

In a 0-2 means the 1st and 3rd crops in the rotation are strips next to each other (this would be a four year rotation like such as corn-wheat-hay-hay where corn 1st year and hay are adjacent or wheat and 2nd year hay are adjacent to each other.

Selecting Filter Strips

(This applies if a filter strip is located at the bottom of the "L"):

- Two Main Choices Are Available Actual Width or Percent of the "Length".
- Select the width and the type of cover. If you do not find the exact match select a similar choice most produce very similar results.

Selecting Contour Buffer Strips

1st Select the actual width of the buffer

- 2nd Select the number of strips in "L"
- 3rd Select the type of cover

Adjust Rock Cover - Guidelines for Estimating Rock Cover in the Field

Introduction: The RUSLE2 computer program has an input box on the Profile view screen for *"Rock cover, %"*. This document offers guidelines for making estimates in the field for the percent cover from rock, rock fragments, or coarse fragments. Coarse fragments on the soil surface effect the Cover and Management factor in RUSLE2. Rock cover does not effect the Soil Erodibility factor.

RUSLE2 Version 2.6.6.4 (Jan 18 20)					
le Database Edit View Option	rs Tools Window Help 83 Q 🛙 🏷 🔐 🗄 📖 🚺 🚔 🛣 🖿 🖬 💶	🖪 📓 🕰 🖉 🦉 🕅 Auto update			
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Field name Fiel	vid number**				
	12		*		
Compare monogement elternatives for	a single hillslope profile				
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Slope length (along slo	ope). #[150	Slope Topography			
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		slope).ft			
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	and the second se			Management alk	vegitive table .
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scenario	Bese manogement default Plan: Adjust rock cover (Adjust Segment	6.0 150 Yield values Yield values	defauit 🚽 (none : Soil	e/ Diversion/tensor, sediment b (rone) Prock cover, N	Red cover set indicates Sof toos OC* Coverveius conditioning order (SOF Veiverveius conditioning order

Caution - Use Good Judgment: Research data shows that the presence of rock cover can significantly reduce soil erosion, and the RUSLE2 model accounts for this effect. However, users should be cautioned to exercise good judgment when developing conservation planning alternatives that reflect the presence of surface rock fragments. For example, a rock cover entry in RUSLE2 that reduces soil loss to acceptable levels should be re-considered if the hillslope shows clear evidence of severe, active erosion.

RUSLE2 uses the Kf (rock free) soil erodibility factor. If surface rock fragments are present and not entered, erosion is over predicted.

RUSLE rock fragments are defined as those greater than 3/8 of an inch in size.

The following are guidelines to use in RUSLE2, if the surface rock fragment cover is not measured in the field.

Surface Texture Modifier	Rock Fragment Content Range	Amount to use if no field measurement
No Texture Modifier	0-15	3
channery, shaly, gravelly, cobbly, cherty, flaggy	15-35	15
very channery, very shaly, very gravelly, very cobbly, very cherty, very flaggy	35-60	35

Estimating Soil Erosion with Ridges and Beds

Ridges and Beds, Defined for Purpose of RUSLE2 Applications

For the purpose of RUSLE2 application, ridges are a series of reoccurring ridges and furrows left by tillage implements such as chisel plows, hippers and disk hillers. The top of these ridges are not flat for any appreciable length. Beds, for the purpose of RUSLE2 application, differ from ridges in that the raised areas (top of the beds) are commonly several feet across the top, and must be at least one foot wide across.

Representing Beds Using RUSLE2

RUSLE2 does not calculate soil loss in the furrows of these beds. Therefore, the topographic inputs must represent the flow path across the bed, then down the side of the bed to the furrow.

This implies that either 1) RUSLE2 provides reasonably good erosion and sediment yield results when minimal erosion occurs in furrows because of high residue cover in the furrows or low furrow grades; or 2) the furrow carries excessive runoff and experiences excessive erosion, a process more closely resembling concentrated flow erosion, a process that RUSLE2 does not currently model.

When Beds are Generally Up-Down the Hillslope:

Represent the cross-section from the middle of one bed to the middle of the next bed. The RUSLE2 output represents runoff and erosion from the middle of the bed to the furrow. Typically, water does not run along the top of the bed for any appreciable length, and instead will run off the side and into the furrow. In the table below, the top of one bed is represented with a 1% grade and 2-ft length, and the sideslope of that bed is represented with a 50% grade and 1-ft length. The adjacent bed across the furrow is represented with similar, but negative values.

SEGMENT	STEEPNESS (%)	LENGTH (ft)
1	1	2
2	50	1
3	-50	1
4	-1	2

When Beds are On or Near the Contour:

Represent the flow path across a bed and down the bed's sideslope to the furrow. An example is illustrated in the table below in which runoff across the top of the bed is represented with a 2% grade and a 4-ft length; and runoff down the bed's sideslope to the furrow is represented with a 50% grade and 1-ft length.

SEGMENT	STEEPNESS (%)	LENGTH (ft)
1	2	4
2	50	1

Representing Ridges Using RUSLE2

Represent the topography up-and-down the hillslope in the path the runoff would follow if the soil surface were flat (as if ridges were not present). If the ridges are on contour/near contour, select the row grade from the drop-down menu for *Contouring*.

NOTE: The science in RUSLE2, in most instances, is adequate to represent ridge-furrow systems because it is based on research data on ridge-furrow systems with a "normal spacing." But RUSLE2 does not adequately represent "abnormally" wide beds, and the subsequent wider spacing of furrows because runoff comes from a larger area on the bed and flow concentrates in the furrow.

A Ridge factor built into RUSLE2 "enhances" erosion when ridges are up-down but "diminishes" it with contouring.

Sediment Delivery in Furrows

RUSLE2 will model sediment deposition in the furrow resulting from low channel grade, but not deposition resulting from increased roughness such as from high residue in the furrow. Currently we have no way of modeling the channel shape and roughness, and the effects of different residue levels in the furrow compared to the ridge or bed.

In eroding landscapes, furrow grades are often too steep for deposited sediment to remain in the furrows. Therefore the sediment delivery value is the same as the soil loss value. However, if the furrow grade is sufficiently flat (often associated with low runoff and/or residue in the furrow), sediment delivery to the end of the furrow will be less than the soil loss value.

Plastic Mulch on Beds and Ridges

Select the Plastic Mulch Application Operation that best represents the percent cover provided by the plastic mulch to the <u>field</u>. So, the estimate of percent cover must include the furrow areas as well as the beds or ridges.

Results of RUSLE2 Calculations

There are several items of information that RUSLE2 provides. Some of these items are very important and needed for certain conservation programs such as the Conservation Security Program. Soil loss, Soil Conditioning Index (SCI) and the Soil Tillage Intensity Rating (STIR) are just a few of RUSLE2 ratings.

Soil Loss for Conservation Planning, recorded in tons/acre/year

The soil loss for conservation planning is the average soil loss over the length of the slope, where partial credit is given if deposition occurs on the slope. It is the value for slope detachment (mass of sediment produced on the slope) reduced by the credit given for the deposition that occurs on the slope. Units (e.g. tons/acre per year) are expressed in terms of mass of sediment, divided by the area determined by the slope length used in the RUSLE2 computation.

	lt		
STEP 1: Choose location to set climate:	Location		
STEP 2: Choose soil type:	Soil		
STEP 3: Set slope topography:	Slope length (along slope), ft	Avg. slope steepness, %	
STEP 4a: Select base management:	Base management 🎦	default	
STEP 4b: Modify/build man. sequence if desired:	Rotation builder		
STEP 4c: adjust management inputs if desired:	Adjust yields 🦳 open	Adjust ext. res. additions 🦳 open 🛛 🛛 Rod	k cover, % 0
	Fuel type for entire run (none) ▼ Energy use for entire simulation, BTU/ac 000 v. diesel use for entire simulation, gd/ac 1.0 Fuel cost for entire simulation, US\$/ac 4.7	Adjust res. burial level Norma	I res. buriel 🚽
STEP 5: Set supporting practices: Contouring	default	Relative row grade, % 100	Crit. slope length, ft 120
Strips/barriers		(none)	Yrs offset from start year (MAN_L Seament Yrs offset
Diversion/terrace, sediment basin Subsurface drainage	(0.0.0)	(none)	Segment from start + _ year, yr
	(none)		1
Results Additional Results Track Biomass Soil loss for cons. plan. (Actyr Tvalue Vector Soil loss for cons. plan OK?	47 Soil Loss T/	AC/YR	×

Soil Conditioning Index (SCI) and Average Annual Soil Tillage Intensity Rating (STIR)

Click the **Additional Results** tab, click the yellow folder next to Soil Conditioning Index. The SCI is the Soil Conditioning Index rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil.

(See next page for example)

Plan: Profile (Temp. scenario[1]) of default		
STEP 1: Choose location to set climate.	Plan: Soil conditioning index (Soil conditioning index[1]) of default	
STEP 2. Choose soil type:	Wind & irrigation-induced ero 0	
STEP 3: Set slope topography:	SCI OM subfactor 1.0 SCI FO subfactor 1.00	
STEP 4a: Select base management. Base	SCIER subfactor -18	
STEP 4b Modify/build man sequence if desired:	Avg. annual slope STIR 0.150 STIR	
STEP 4c: adjust management inputs if desired:	Soil conditioning index (SCI) -3.52 Value	ver. % 0
Energy u Equiv. diesel Fuel c	Annual STIR Values by Crop Year SCI Value	bunel
STEP 5: Set supporting practices: Contouring		Crit. slope length. # 120
	A Management 1	
Strips/barriers		Yrs offset from start year (MAN_I) Yrs offset
Diversion/terrace, sediment basin		Segment from start
Subsurface drainage		+ - year, yr
Ros ats Additional Results 1 ack Biomass		
Soil loss erod, portion, Vac/yr 47 Sediment delivery, Vac/yr 47	Crop year results open Soil conditioning index open SCI value OK?	Surf rus cost vehicing
Avg. ann. forage harvest, lb/ac		
Net event runoff, in/yr		

Printing Reports

After you have completed data entry and the results are displayed in either the WORKSHEET, PLAN, or PROFILE view, you can print the results for viewing and saving as a permanent record. The record can be saved anywhere in your file directory.

Note: The instructions below can be used for either the WORKSHEET, PLAN, or PROFILE view.

RUSLE2 Version 1.25.8.0 (Dec 19	2005)	- 7
File Database Edit View Options Windo	w Help	
Open Close Ctrl+F4	9 21 🔂 🖸 🖿 🛰 📽 🛊 📾 🗋 🚖 🏦 🌬 🖿 🌌 🔤 🔤 🚰 🏹 Auto update	
Save Ctrl+S Save As	uidance*	
Import Export	Example Farmer Info JSA\MarylandVAllegany County Info	<u>~</u>
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Delete	Selected alternatives for fields	
Recent File	Field name Description	Cons. plan. Sed. soil loss, delivery,
Print Report	1 test	0.64 0.056
Print contents (unformatted) Print Setup		
Exit Alt+F4		

1) Click on File on the menu toolbar. Select Print Report.

2) After the dialogue box appears, choose a print template that will display the SCI and STIR value. For example in Plan View, choose MD NRCS RUSLE@ Plan Record short 06062013.pln.dot or MD RUSLE2 Plan Record Detail.pln.dot. After selecting the appropriate template, click "Open". MS Word will open and display your record of results. At this point, you have the option of printing and/or saving the document in your file directory. If you want to save this RUSLE2 run, click the File menu, and do a Save As. Give it a name and Save.

	► OS (C:) ► ProgramData ► USDA ► RUSLE2 ► NRCS ► Printing	▼ \$	Search Printing	2
Organize New folder				0
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> 🜱 OS (C:)	🗐 VA Plan Printout w Details.2007r.pln.dot	8/15/2014 3:28 PM	Microsoft Word 97	

Help Screens

Version 2 of RUSLE has been outfitted with various help screens to aid the user when developing soil loss calculations. To access the help screens, follow the example below.

In this example we chose Base Management. Place cursor over the section you would like help on and right click. Choose "Help".

	RUSLE2 Version 1.25.8.0 (Dec 19 2005)	X
Fi	le Database Edit View Options Window Help	
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	🗧 🔲 🔀	
	STEP 1: Choose location to set climate: Location	
	STEP 2: Choose soil type: Soil	
ľ	STEP 3: Set slope topography: Slope length (along slop Avg. slope steepness, %	F
Ш	STEP 4a: Select base management Base management CMZ 59\c. Other Local Mgt Records\Example farm	
	Help STEP 4b: Modify/build man. sequence if desired: Highlight Disable Man. Manag + Obsable Always show Starting Ending Correct date, m/d/y dates by: 1 CMZ 59\c. 0ther Local Mgt Column width Header size Expand grid	_
-	Apply rot. builder manage. sequence to erosion calc. Apply Save temp. management as permanent Save	en
	STEP 5: Set supporting practices: Kontouring b. absolute row grade 0.3 percent Actual row grade, % 0.30 Crit. slope length, ft 150	i/t
	Strips/barriers (none) Yrs offset from start vear [
H	Segment Yis offset	Н
Iľ	Diversion/terrace, sediment basin (none)	Н
	Subsurface drainage (none)	

The following help screen will appear.

STEP 3: Set slope topography: Skope tergin (along alon) Avg. stope treepness. 4	1
STEP 4a: Select base management Base management CMZ 59\c.Other Local Mgt Records\Example farm	
😰 Help	×
Base management.	^
Management refers to the array of dates, operations, vegetations, and other information used to describe a cropping-management system or a similar list of operations. A set of base management records are set up and made available for use as a starting point and guide for other similar management systems that a user may need to create.	
The base management generally assumes a rotation where the cycle of operations is repeated based on the dates in the list of operations. However, non-rotations, such as the recovery period following closing a landfill, can be analyzed. Whether or not the management is a rotation is set within the management screen.	
A rotation can be as short as one year (e.g. continuous corn) or as many years as necessary for the cycle to repeat. Also, more that one crop can be grown in a 1-year rotation, such as series of vegetable crops like broccoli, sweet corn, and green beans.	
A "no operation" is used in the list of operations if no operation occurs in the last year of the rotation. For example, a "no operation" would be used to add a fallow year if no operation happened to occur in the fallow year.	
The base management assumes that this management is applied to the entire slope length. Permanent vegetative strips (buffer strips) can be placed on the slope with the base management or the base management can be set in equal width strips (rotational stripcropping) on the slope where the management is rotated on each strips. The type of strip system is selected in supporting practices.	

<u>Abbreviations – Arranged Alphabetically</u>

bd	broadcast method of seeding, usually cover crop
dc	double cropping such as corn or soybeans following small grain, or corn following hay harvest; mostly in south-central and south-eastern PA
dcnr	same as above but planted with a drill
fc1 fc2 passes	field cultivator equipped with sweeps – one pass field cultivator equipped with sweeps – two
fcst	chisel with straight shanks – moderately aggressive chisel
fcswp	chisel with sweeps – less aggressive chisel
fctw chisel fdos	chisel with twisted shanks – most aggressive offset disk – most aggressive disk
fds	light tandem disk – less aggressive disk
fdt	heavy tandem disk – moderately aggressive disk
fnts	strip till – no till where a strip of soil is disturbed by a chisel point in the fall prior to planting, and by coulters mounted on the planter or on a tool bar in front the planter
fp	fall moldboard plow
fs	fall seeded
gr	harvested for grain
inj	manure injected
int or intsd	inter-seeded by air into the standing crop
manb	manure bedded
maninjhd	manure liquid injected with high disturbance injector
maninjld	manure liquid injected with low disturbance injector
manl	manure liquid
manp	manure poultry
manss	manure slurry
nr	narrow row crops generally drilled at 7 inch spacing
	note: corn is wide row (30 inch spacing), unless specified as nr, which is 18 inches; small grains are always narrow row (and not specified)
nt	no till

Abbreviations – Arranged Alphabetically cont.

nts	strip till – no till where a strip of soil is disturbed by a chisel point in the spring prior to planting, and by coulters mounted on the planter or on a tool bar in front the planter
ntz	zone till – no till where a strip of soil is disturbed by fluted coulters mounted on the planter or on a tool bar in front of the planter
oatcc	oat cover crop
р	moldboard plow
рс	plastic culture for vegetables
rc	row cultivator used during the growing season, primarily for weed control
rt	ridge till – row crops are planted on ridges formed during the prior growing season; not common in PA
sc1 sc2 passes	field cultivator equipped with sweeps – one pass field cultivator equipped with sweeps – two
scst scswp	chisel with straight shanks – moderately aggressive chisel chisel with sweeps – less aggressive chisel
sctw sdos	chisel with twisted shanks – most aggressive chisel offset disk – most aggressive disk
sds	light tandem disk – less aggressive disk
sdt si or sil	heavy tandem disk – moderately aggressive disk harvested as silage
sp	spring moldboard plow
SS	spring seeded
wgcc	winter grain cover crop
wr	wide row crops generally planted with a planter at 30 inch spacing
	note: corn is wide row (30 inch spacing), unless specified as nr, which is 18 inches; small grains are always narrow row (and not specified)

Abbreviations – Arranged by Category

Crops and cropping

dc	double cropping such as corn or soybeans following small grain, or corn following hay harvest; mostly in south-central and south-eastern PA
dcnr	same as above but planted with a drill
gr	harvested for grain
рс	plastic culture for vegetables
si or sil	harvested as silage
oatcc	oat cover crop
wgcc	winter grain cover crop

Manure and manure management

inj	manure injected
manb	manure bedded
maninjhd	manure liquid injected with high disturbance injector
maninjld	manure liquid injected with low disturbance injector
manl	manure liquid
manp	manure poultry
manss	manure slurry

Planting and related operations

bd	broadcast method of seeding, usually cover crop
int or intsd fs	inter-seeded by air into the standing crop fall seeded
nr	narrow row crops generally drilled at 7 inch spacing note: corn is wide row (30 inch spacing), unless specified as nr, which is 18 inches; small grains are always narrow row (and not specified)
nt	no till
fnts	strip till – no till where a strip of soil is disturbed by a chisel point in the fall prior to planting, and by coulters mounted on the planter or on a tool bar in front the planter
nts	strip till – no till where a strip of soil is disturbed by a chisel point in the spring prior to planting, and by coulters mounted on the planter or on a tool bar in front the planter
ntz	zone till – no till where a strip of soil is disturbed by fluted coulters mounted on the planter or on a tool bar in front of the planter
rc	row cultivator used during the growing season, primarily for weed control
rt	ridge till – row crops are planted on ridges formed during the prior growing season; not common in PA
SS	spring seeded
wr	wide row crops generally planted with a planter at 30 inch spacing note: corn is wide row (30 inch spacing), unless specified as nr, which is 18 inches; small grains are always narrow row (and not specified)

Tillage

Below the tillage types, are the codes and abbreviations in **bold**, i.e., **fp**, that are part of the crop template name. Primary tillage types are listed. Under the secondary tillage, are the operations used in preparation of the crop templates. A listing of the same piece of equipment more than one time indicates more than one pass over the field with that implement.

PRIMARY TILLAGE	SECONDARY TILLAGE
Moldboard Plow fp (fall) sp (spring)	Disk, tandem heavy primary Disk, tandem light finishing Harrow, coiled tine
Chisel, twisted fctw (fall) sctw (spring) (high tillage/low residue)	Disk, tandem heavy primary Disk, tandem light finishing
Chisel, straight fcst (fall) scst (spring) (moderate tillage/moderate residue)	Disk, tandem heavy primary Disk, tandem light finishing
Chisel, sweeps fcswp (fall) scswp (spring) (low tillage/high residue)	Cultivator, field 6-12" sweeps
Disk, heavy/offset fdos (fall) sdos (spring) (high tillage/low residue)	Disk, tandem heavy primary Disk, tandem light finishing
Disk, tandem heavy fdt (fall) sdt (spring) (moderate tillage/moderate residue)	Disk, tandem heavy primary Disk, tandem light finishing
Disk, tandem fds (fall) sds (spring) (low tillage/high residue)	Disk, tandem secondary
Cultivator, field; 6-12" sweeps* ffc1 (fall) sfc1 (spring)	none
Cultivator, field; 6-12" sweeps* ffc2 (fall) sfc2 (spring)	Cultivator, field; 6-12" sweeps

*1 & 2 in symbol denotes the number of implement passes

Seedbed Conditioner – is <u>Vertical-Till</u> or Turbo-Till High residue crop

Manure Operations – Abbreviations and Descriptions

The following is a list of manure operation abbreviations and their descriptions, as used in the preparation of crop templates for Crop Management Zones 4.1, 62 (intermediate planting dates), and 65. The manure types are the codes that are part of the crop template name for all templates where manure is used. The spreaders are specifically selected because of the properties included in the databases. The manure types were selected to represent the most common types of manure used in each of the multi- state CMZs. The decomposition rates are included in the database. The table shows the average dry matter that is applied for each method. The dry matter rates are based on average N- and P-based nutrient management plan rates for typical yields of grain and silage corn.

MANURE	TYPE MANURE SPREADER	LBS. DRY MATTER
LIQUID		1000
manl	Liquid spreader (50% infiltration)	6000 gal @ 2% dry matter
maninjhd	Injector – high disturbance 30" (50%)	6000 gal @ 2% dry matter
maninjld	Injector – low disturbance 15" (30%)	6000 gal @ 2% dry matter
MANURE, MOE	DERATE BEDDING	3000
manb	Manure spreader, solid & semi-solid	6 tons @ 25% solids
MANURE, POU	LTRY	3000
manp	Manure spreader, solid & semi-solid	6 tons @ 50% solids
MANURE, SEM	I-SOLID & SLURRY	3000
		10 tons @ 15% solids or 5000 gal @ 7% solids
manss	Manure spreader, slurry	<i></i>

Example Cropping System Worksheet

Producer: John Smith Tract No: 943 Fields: 1, 2, 3, & 4 **Crop Rotation** 1st Year 4th Year Corn/Grain Winter Wheat 5th Year 2nd Year Fallow Alfalfa (7 years) 3rd Year 6th Year Bean **Tillage Operations and Yield** Yield (5-year Average Normal Precipitation) Corn - 130 bu yield Crop 4: Barley - 70 bu yield Crop 1: Date: **Operations:** Date: **Operations:** 4/1 Moldboard Plow 3/15 **Disk Offset** 4/15 Tandem Disk 4/1 Cultipacker, roller 4/5 Double-disk Drill - 10" row 4/20 Chisel w/sweeps 5/1 Double-disk Planter - 30" rows 7/1 Harvest Graze Wheat Stubble 6/15 Row Cultivate 9/1 7/1 Row Cultivate 10/1 Harvest for Grain Crop 2: Fallow Crop 5: Alfalfa - 4 ton yield Date: **Operations:** Date: **Operations:** 5/15 Offset Disk 4/1 Moldboard Plow 6/15 **Chisel Plow Sweeps** 4/15 Offset Disk **Chisel Plow Sweeps** 7/20 4/20 Tandem Disk Double-disk Drill - 10" rows 9/1 Chisel Plow 5/15 7/1 Harvest 9/1 Harvest 10/1Graze Alfalfa Aftermath Crop 3: Beans - 20 cwt yield Crop 6: Date: **Operations:** Date: **Operations:** 3/1 Grazed Corn Stubble 5/1 Moldboard Plow 5/15 Tandem Disk 5/20 Chisel with Sweeps 6/1 Double-disk Planter - 30" rows 7/1 Row Cultivate 9/10 Harvest

Cropping System Worksheet

Producer:			_
Tract No:		Fields:	
Crop Rota	ation		
1 st Year		4 th Year	
2 nd Year		5 th Year	
3 rd Year		6 th Year	
Tillage Op	perations and Yield	Yield (5-yea	r Average Normal Precipitation)
Crop 1:		Crop 4:	
Date:	Operations:	Date:	Operations:
Crop 2:		Crop 5:	
Date:	Operations:	Date:	Operations:
Crop 3:		Crop 6:	
Date:	Operations:	Date:	Operations:
		— —	

Equipment Worksheet

Check the boxes below for Field Equipment used in your farming operation:

P	lanter
	Double-disk opener with or without fluted coulter
	Double-disk opener, 18" rows
	Furrow opener in 4", 6", or 8" deep furrows
	In-row subsoiler
	Narrow slot w/smooth or rippled coulter
	Runner opener
	Ridge till attachments
	Strip till attachments

Fertilizer Applicators

-	•·····-•· ···pp••··•
	Coulter, high pressure injector, 12" spacing
	Anhydrous knife, 12" spacing
	Shank low disturbance, 12" spacing
	Deep placement heavy shank
	Surface broadcast spreader
	Anhydrous knife, 30" spacing
	Strip till, 30" spacing

Drill or Air Seeder
Tee slot openers, 7-10" rows
Hoe/chisel openers, 12-15" rows
Hoe/chisel openers, 6-12" rows
Sweep or band opener
Offset double-disk openers
Double-disk openers
Single-disk openers, 7-10" rows
Double-disk opener w/fluted
coulter
Double-disk opener w/fert.
openers
Single-disk openers + fert.
openers, 7-10" rows/spacing
Deep or semi-deep furrow, 12-
18" spacing
Heavy, direct-seed, double-disk
opener with or w/o row cleaners
Double-disk, 7-8" packer

C	Other Equipment

Manure Application	
Liquid high disturb, 30" spacing	
Liquid low disturb, 30" spacing	
Liquid low disturb, 15" spacing	
Dry manure spreader	

C	Combine		
	Rotary with residue spreader		
	Rotary without residue spreader		
	Non-rotary with residue spreader		
	Non-rotary without residue spreader		

Stalk Shredding	Equipment

Shredder, flail or rotary
Shredder, rotary mower
Stalk chopper, rotary
Other shredding equipment

illage/Cultivation Equipment
Field cultivator, field, 6-12"
shovels
Chisel, sweep shovel
Field cultivator, field, 6-12"
sweeps
Chisel, twisted shovel
Field cultivator, field w/ spike points
Disk, offset, heavy
Disk, tandem, heavy primary
Disk, tandem, light finishing
Mulch finisher (one pass)
Residue, row cleaner
Rodweeder
Rotary hoe
Rowcultivation
Seedbed Conditioner
Subsoiler
 Subsoiler ripper, 24-40" deep
Harrow, coiled tine
Harrow, heavy or rotary
Harrow, spike tooth or tine on beds
Power mulcher bed conditioner
Plow, disk
Plow, moldboard