



# MARYLAND



## INSTRUCTIONS & USER'S GUIDE

October 2010

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**NOTE:** There is more help and instructions available within the RUSLE2 Program than what is presented in these instructions by visiting the RUSLE2 web site at [http://fargo.nserl.purdue.edu/rusle2\\_dataweb/RUSLE2\\_Index.htm](http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm) Additional information is also available in the **RUSLE2** program itself on the **HELP** screens.

This instruction guide was created as a supplement to hands-on training not as stand alone documentation. For more information and questions, feel free to contact Jerry Raynor, Maryland NRCS State Resource Conservationist @ 443-482-2908 with any questions that arise. E-mail address: [jerry.raynor@md.usda.gov](mailto:jerry.raynor@md.usda.gov)

## 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 THIS USER'S GUIDE

The purpose of this User's Guide is primarily to describe individual RUSLE2 factors and to provide guidance on how to choose values used by RUSLE2. However, that information is best described by having the RUSLE2 program open and moving through the program as various topics are discussed. The following information is a general overview. Other documents should be consulted to provide details on the mechanics of the RUSLE2 program.

This User's Guide describes **RUSLE2**, its factors, selection of input values to compute its factor values, and application of **RUSLE2**. The TABLE OF CONTENTS lists the topics covered by the User's Guide.

**RUSLE2** is a straight forward, easily used computer program that is best learned by using it. As you become familiar with the operation of the program, we encourage you to thoroughly read the User's Guide on **RUSLE2**.

Like all other hydrologic models, **RUSLE2** has its limitations and its proper approach for selecting input values and interpreting computed values. Before you begin to apply **RUSLE2** to your own problems, you should become well acquainted with **RUSLE2** and its factors.

This User's Guide provides instructions for application of **RUSLE2**. This guide is not complete, but it should be sufficient for most applications. Additional information is available in the **RUSLE2** program itself on the **HELP** screens.

## 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:

$$A = R K L S C P$$

where **A** = average annual soil loss from rill and interrill erosion caused by rainfall and its associated overland flow (tons ac<sup>-1</sup> yr<sup>-1</sup>), **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.

## GENERAL USE OF THE RUSLE2 PROGRAM

The **RUSLE2** program is simple and easy to use. Rill and interrill erosion at a specific site is a function of the weather, soils, topography, and land use at the location. Data for variables that represent these factors are stored in **RUSLE2** databases. **RUSLE2** is run by selecting database entries to represent site-specific conditions. **RUSLE2** then computes soil values using this information. Most of the input values needed to run **RUSLE2** are readily available in existing database files that are supplied with the program. If the necessary data are not available, the parameters used in **RUSLE2** are simple so that new values can be easily developed.

Erosivity (**R** factor) values for locations where a particular user will apply **RUSLE** are in a database file in the **RUSLE** computer program. **RUSLE2** also uses values for the bimonthly distribution of the erosivity. Values used by **RUSLE2** for average monthly temperatures and precipitation are available in the **RUSLE2** data files supplied with the program or can be obtained from readily available weather records.

Soil erodibility (**K** factor) values are selected from soil survey information available in field offices of the USDA-Natural Resources Conservation Service (NRCS). The particular site is located on a soil survey map, and the erodibility of the soil-mapping unit at the site is identified and entered into the **RUSLE2** program. If values are not available, they can be calculated using the Soil Erodibility Nomograph in the **RUSLE2** program.

Slope length, steepness, and other topographic (**LS** factor) values are determined from an on-site visit or from other topographic information such as highly detailed contouring maps. These values are entered directly in the **RUSLE** program.

Land use is the simple most important factor that determines rill and interrill erosion. The typical objective in conservation planning is to use **RUSLE2** as a guide in choosing a land use practice that controls erosion to an acceptable rate. The effect of land use in **RUSLE2** is considered in the terms of management practices (**C** factor) along with supporting practices (**P** factor) like contouring that is added to the basic management practice.

Management practices refer to such things as the tillage, cropping, vegetation, and erosion control materials that are applied to the hillslope. A database file for a management practice in **RUSLE2** involves a set of dates with corresponding operations, vegetations, and residues. Numerous management files are included in the management database that comes with the **RUSLE2** program. With **RUSLE2**, the user selects an existing management file, or a new one is created to represent the particular field condition. In almost all cases, an existing management file can be used, but if a new one is created, it is saved for use in other similar applications.

Operations are discrete events that change properties of live vegetation, residue, and/or the soil that affect rill and interrill erosion. Examples of operations include tillage, planting, harvesting, grazing, burning, frost, and ripping. Certain information used to describe operations is stored in operation files that are contained in a **RUSLE2** operations database that comes with the **RUSLE2** program. Operations are selected from the operation database to describe management practices. If an operation is not available in the operations database, one can be created and stored in the database for later reuse.

Vegetation is one of the most important factors that affect erosion. Certain operations like those associated with planters and drills that seed crops call a vegetation file that represents live vegetation that is being considered in the application of RUSLE2. Just like for operations, vegetation files are developed for the various vegetations that are encountered in RUSLE2 applications. Several vegetations are in the vegetation database that comes with RUSLE2. If the necessary file is not available in the RUSLE2 database, a new vegetation file can be created and added to the database.

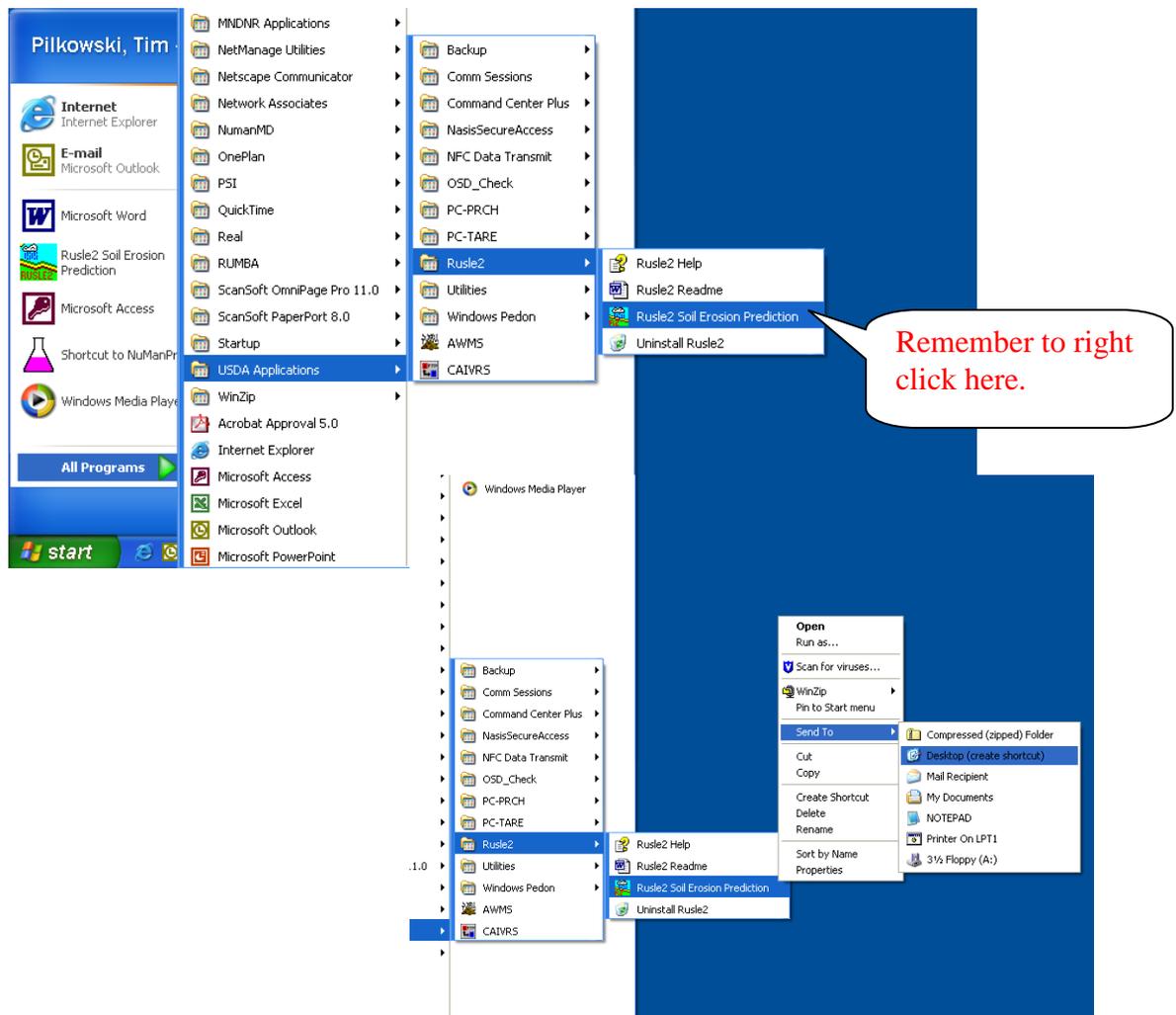
Ground cover produced by crop residue and plant litter is the single factor having the greatest effect on erosion. Plant residue is the vegetative material left after live vegetation is killed. Such operations as shredding and tillage convert standing residue to flat residue and to buried residue. RUSLE2 also track both live and dead roots. Each vegetation produces residue. Residue data files are included in the residue database provided with RUSLE2. A residue file is assigned to each vegetation file, and additional residue files can be created and saved in the RUSLE2 database.

Residue data files are also used to describe mulch and manufactured materials applied to construction sites to control erosion.

## RUSLE2 PROGRAM SETUP

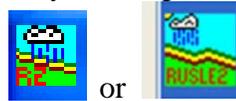
### Create a RUSLE2 Shortcut Icon for your desktop

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

A. You can open the RUSLE2 program by clicking on the RUSLE2 icon on the Desktop.



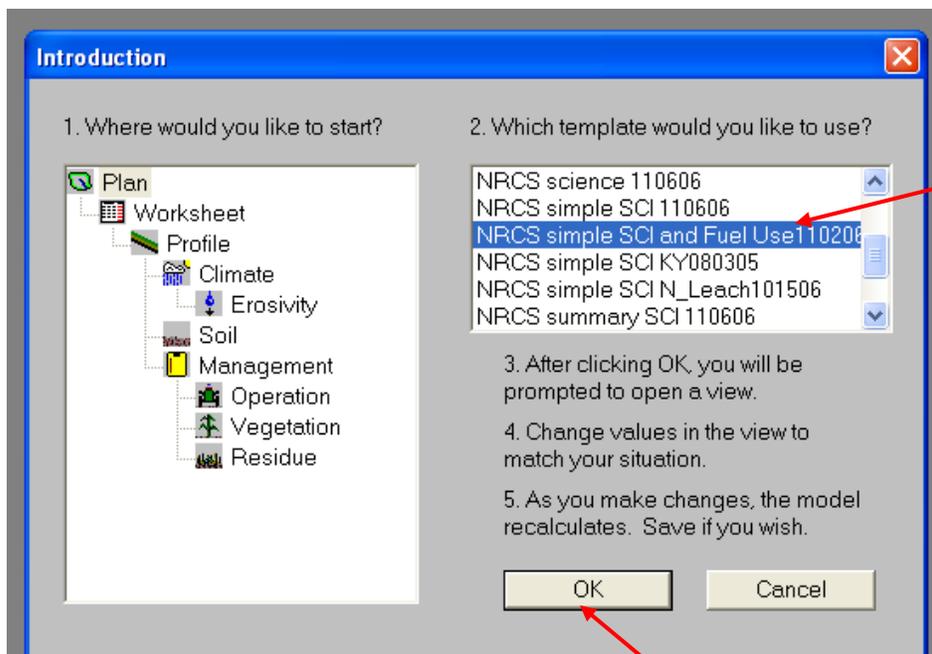
OR BY

B. Clicking on Start>Programs>USDA Applications> RUSLE2

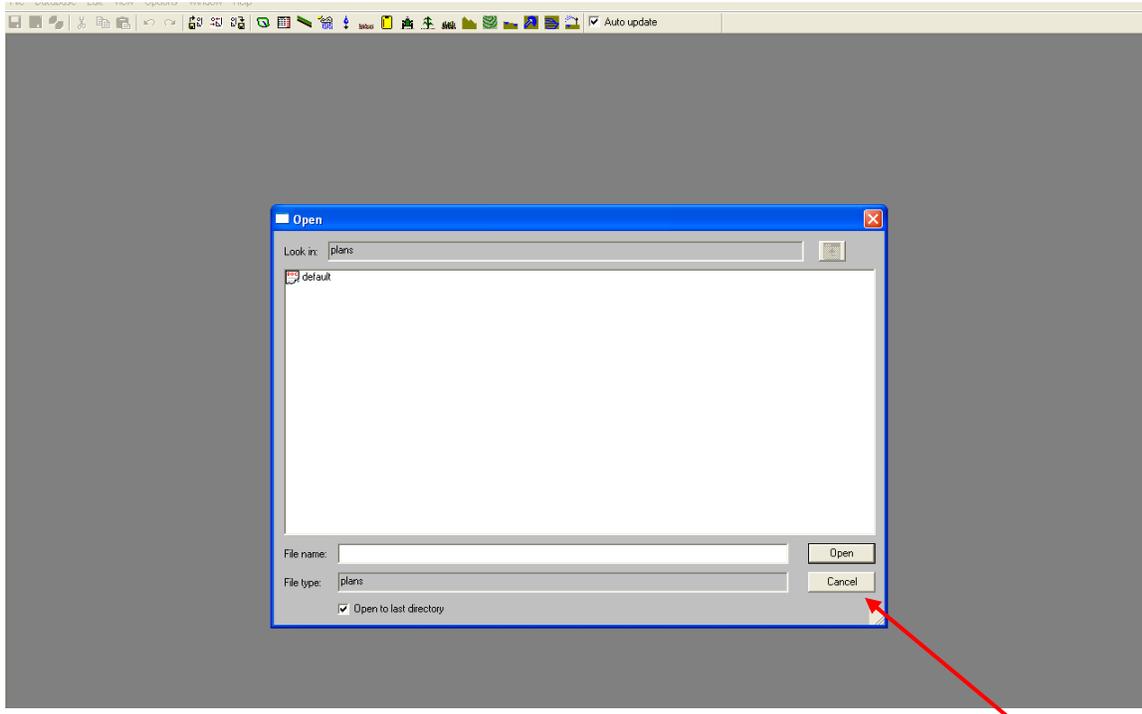
## Choosing the correct template

### **Step 1: Choose the correct template for running RUSLE2**

The following screen should appear when you first open RUSLE2. You want to choose the NRCS simple SCI & Fuel Use110206 template. You may also choose NRCS simple SCI N\_Leach 101506 if you prefer to display the Nitrogen Leaching Index. Both templates are the same otherwise. Once you choose this template then simply click OK. This will set your RUSLE2 program to the correct template.

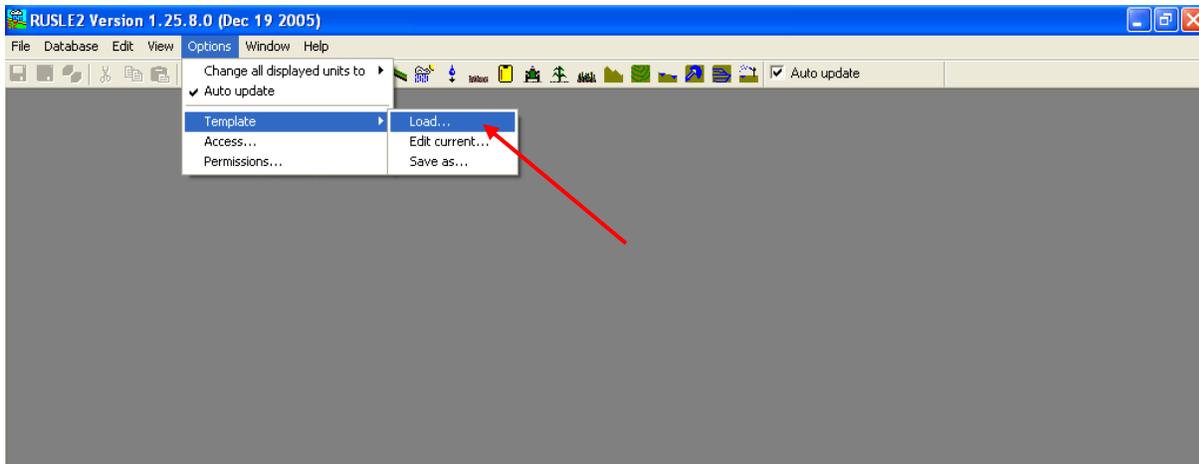


The following screen may or may not appear. If this screen appears, click “cancel”.

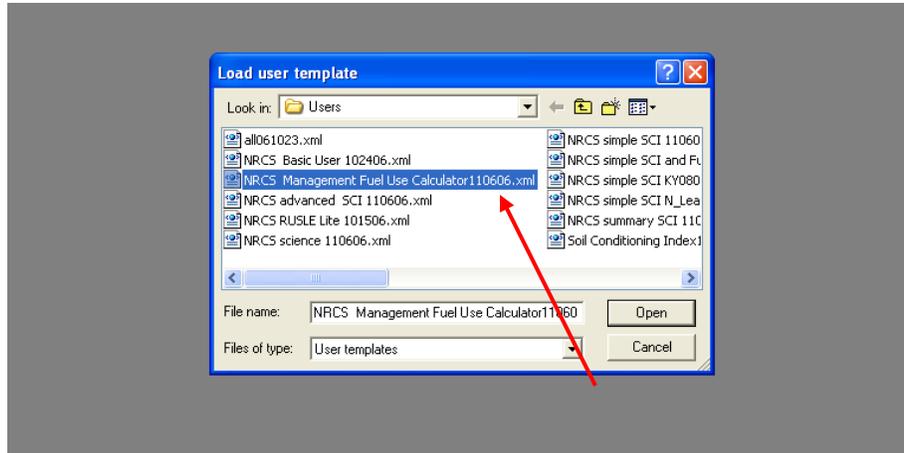


If for some reason neither of the above screens appear, simply go to the “Options” menu to set the correct template. Follow the procedure below:

From the toolbar menu, click on Options / Template / Load



When the following screen appears, choose NRCS simple SCI & Fuel Use110206.xml or you may choose NRCS simple SCI N\_Leach 101506 (for the Nitrogen Leaching Index). Next click open. This will set you computer to the proper template.



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

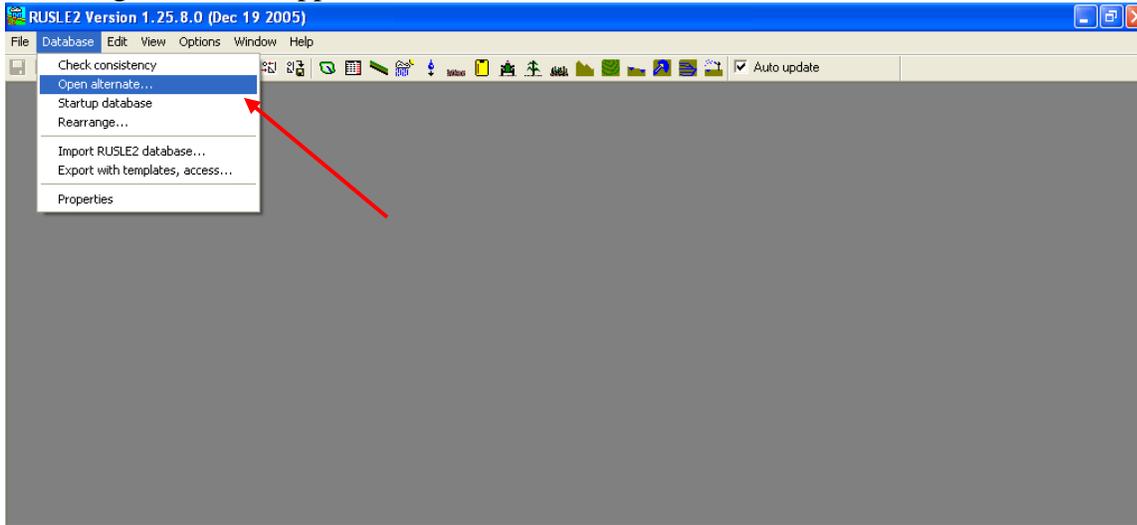
### Set your RUSLE2 Program to the Correct Database **(FOR NRCS USERS ONLY)**

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 RUSLE2 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.**

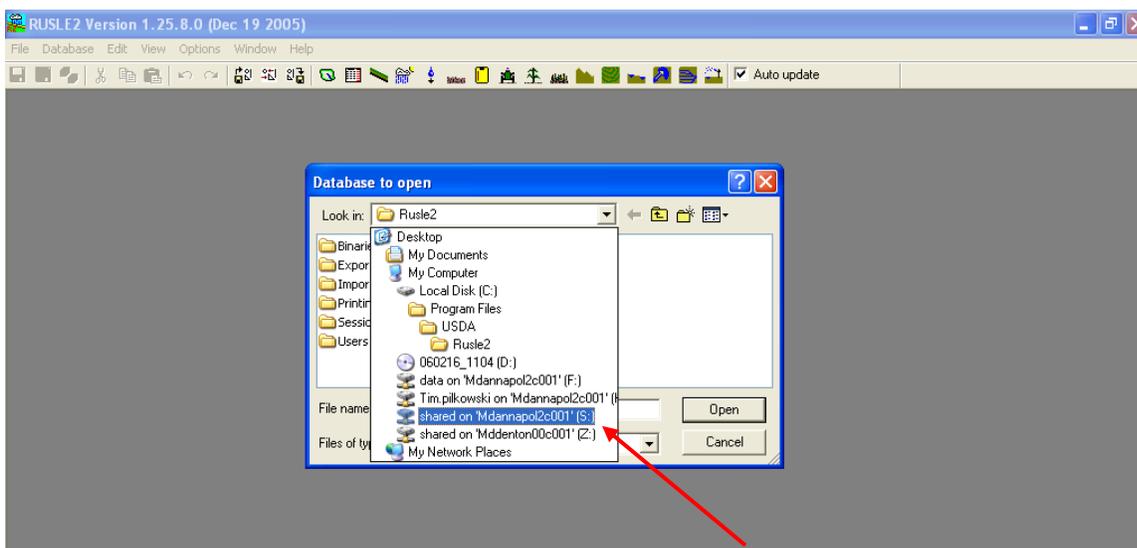
When RUSLE2 was installed on your computer, the program creates and automatically defaults to a “moses” database located on your C: drive. You will need to re-direct this database to your S: shared “county\_moses” database. To do this simply complete the following steps:

**Step 1:** At the top of the RUSLE2 screen click on Database, then choose Open Alternate. The following screen will appear.



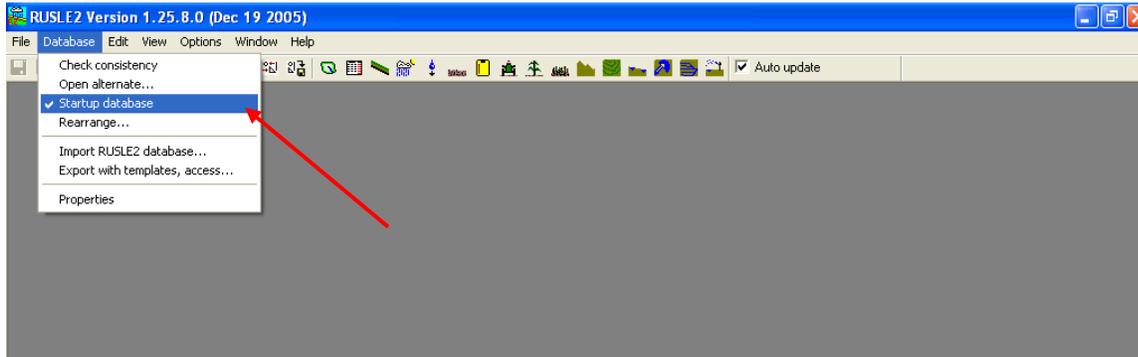
**Step 2:** Click the drop down menu, navigate to your S:Drive and locate your shared “moses” database. Your shared “moses” database is located at S:\Service Center\NRCS\RUSLE2. In there should be your specific county “moses” database. It should be named county\_moses. For example: Carroll\_moses. Click 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.

**Note:** You do not need to import the supporting database sets such as Climate, Soils and/or CMZ for your area. They are linked to your existing “moses” database in your shared drive. If you choose at some point to use your C:Drive “moses” database, then you will need to import these supporting database sets.



**Step 3 – Set your shared “moses” database to always open to this database**

You should now set the S: shared “moses” database to always open each time you boot up RUSLE2. 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 PAGES 14 THROUGH 20 FOR IMPORTING DATABASE SETS. ALL CLIMATE, SOILS AND CMZ DATABASE SETS FOR YOUR AREA ARE AVAILABLE FOR USE. YOU MAY SKIP THE STEPS BELOW AND GO DIRECTLY TO RUSLE2 INTRODUCTION ON PAGE 21 OF THIS DOCUMENT.**

**IF YOU DO NOT HAVE AN S: DRIVE SHARED “MOSES” DATABASE, YOU WILL NEED TO COMPLETE THE FOLLOWING STEPS ON PAGES 14 THROUGH 20.**

## RUSLE2 ARCHIVE FOLDERS

### Create a “RUSLE2\_Archive” folder

Create a folder in your Shared Directory which can then be used now and in the future to store all of your RUSLE2 files for later import and export.

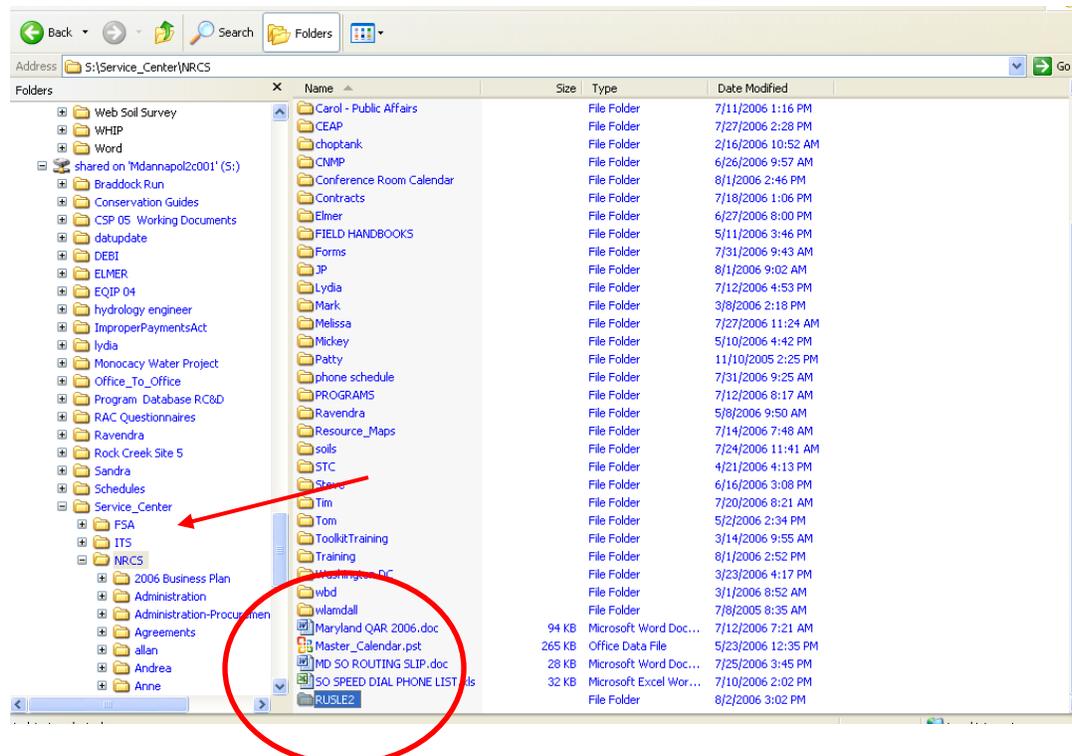
**Note: Your RUSLE2 Archive Folder may already be created for your office. To check this, simply navigate to your shared drive under the following address: For none NRCS users, you will create these folders in your C:drive.**

\\mdyouroffice\shared\Service Center\NRCS\RUSLE2\RUSLE2 Archive

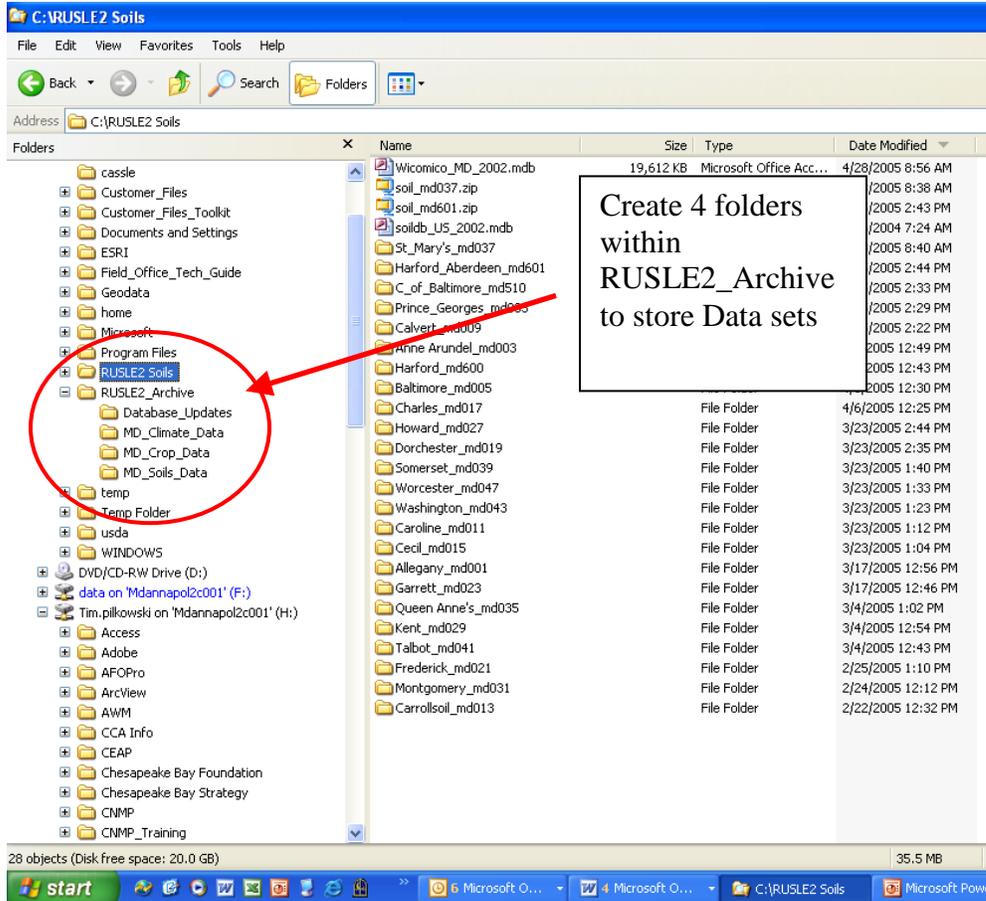
If your database files are present, you do not need to create the Archive Folder. Database sets have already been downloaded. You only need to import the database sets to your computer for use in RUSLE2. If your shared folder has been created and database files are present, skip to “Importing the RUSLE2 Database Sets, page 9 of this guidance document, otherwise continue below:

**Step 1:** Open Windows Explorer. Create a folder in your S (Shared) directory at the following pathway: \\mdyouroffice\shared\Service Center\NRCS\RUSLE2\RUSLE2 Archive

The folder RUSLE2\_Archive can be used now and in the future to store all the RUSLE2 files for later import and export files.



**Step 2:-** Next, create four folders within the RUSLE2\_ Archive folder. The first folder name MD\_Climate\_Data, the second name MD\_Crop\_Data, the third name MD\_Soils\_Data and the fourth name Database\_Updates. These are the folders within RUSLE2\_ Archive where you will save database sets you will need to download from the website. These will also be used to import the database sets for your RUSLE2 program.



DOWNLOADING THE RUSLE2 DATABASES

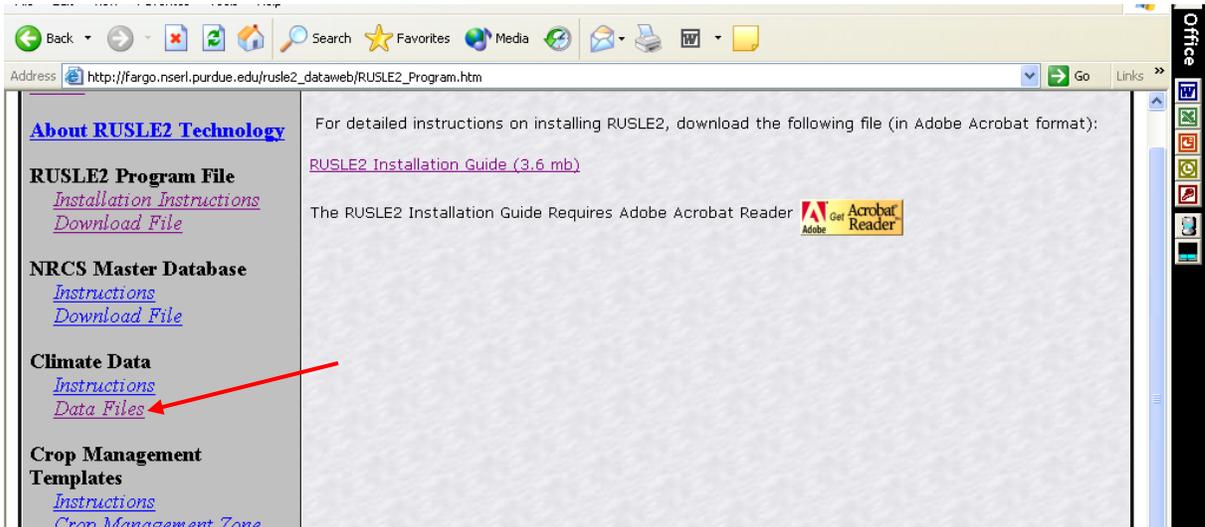
## Download database files from RUSLE2 Website

The following steps are needed to install the Climate, Soils, and Crop Management databases.

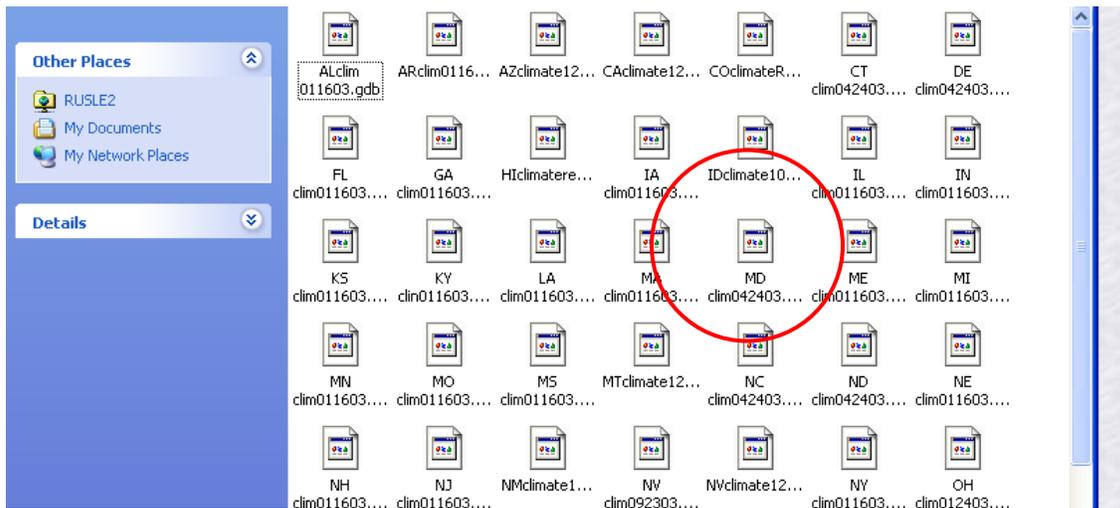
**Step 1:** Go to the website [http://fargo.nserl.purdue.edu/rusle2\\_dataweb/RUSLE2\\_Index.htm](http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm). This site contains the “official” database sets to download and use for RUSLE2.

**Step 2:** Download the following from the above website and save it into your specific Data folder within your **RUSLE2\_ Archive** folder. Remember this folder is located in your Shared Drive under the following:  
\\mdyouroffice\shared\Service Center\NRCS\RUSLE2\RUSLE2 Archive

1. Climate Database for Maryland. Click on “**Data Files**” under Climate Data

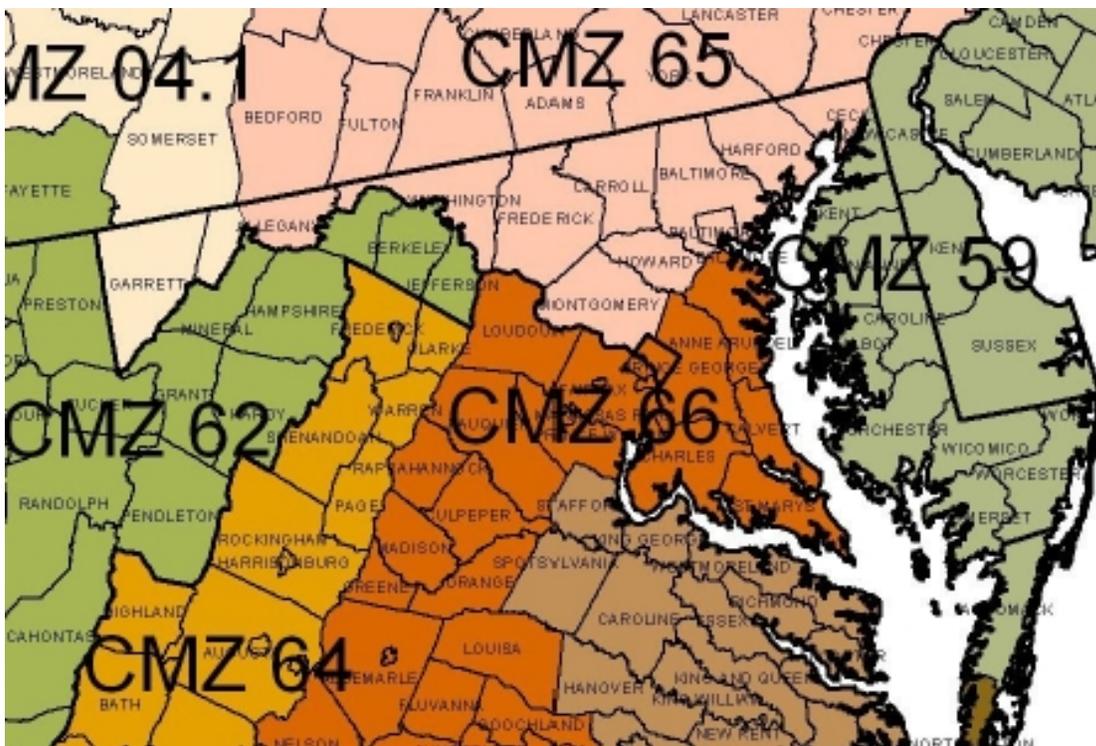


- The following screen should appear. At this screen double click on the MD Climate file and save into your RUSLE2\_Archive \ MD\_Climate\_Data folder.



2. Next, download the Crop Management Zone files. Follow the same procedure as the Climate Data files. Download the Crop Management Zone(s) (e.g. CMZ 65) that covers your respective work area. You may download nearby CMZ's from your area depending on areas you work in. See Figure 1 this page for a map of Crop Management Zones.
3. Finally, download the Soils Database for your counties of choice. NOTE: The soils databases are county specific. Only download the counties for which you will be working in. Do not download all counties since these are large files that will take up unnecessary space on your computer. This will reduce program processing time when using RUSLE2, although newer versions of RUSLE2 has seem to overcome this.

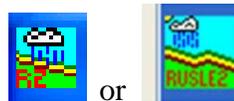
**Figure 1. MARYLAND CROP MANAGEMENT ZONES**



|                                |
|--------------------------------|
| IMPORTING THE RUSLE2 DATABASES |
|--------------------------------|

## Import the database sets into RUSLE

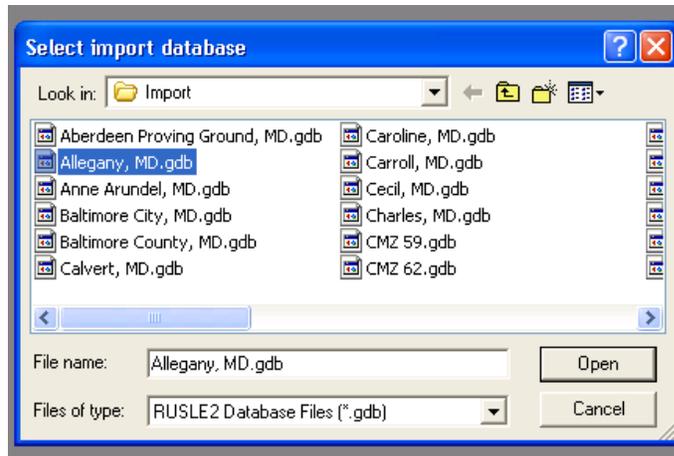
- A. Return to Windows Explorer. Open the RUSLE2\_ Archive folder where you saved the Soils Database, the Climate Database, and the Crop Management Zone (CMZ) files.
- B. Copy the Climate database file from your RUSLE2\_ Archive Folder into C:/Program Files/USDA/RUSLE2/import folder. This is where the RUSLE2 import utility will look for this file. Repeat this process for the county soils database(s) files and the desired CMZ database(s). These are the one's you downloaded prior to installing the RUSLE2 program.
- C. Exit out of Windows Explorer and open the RUSLE2 program. (Click on Start>Programs>USDA Applications>Select RUSLE2) or (Click on shortcut button.)



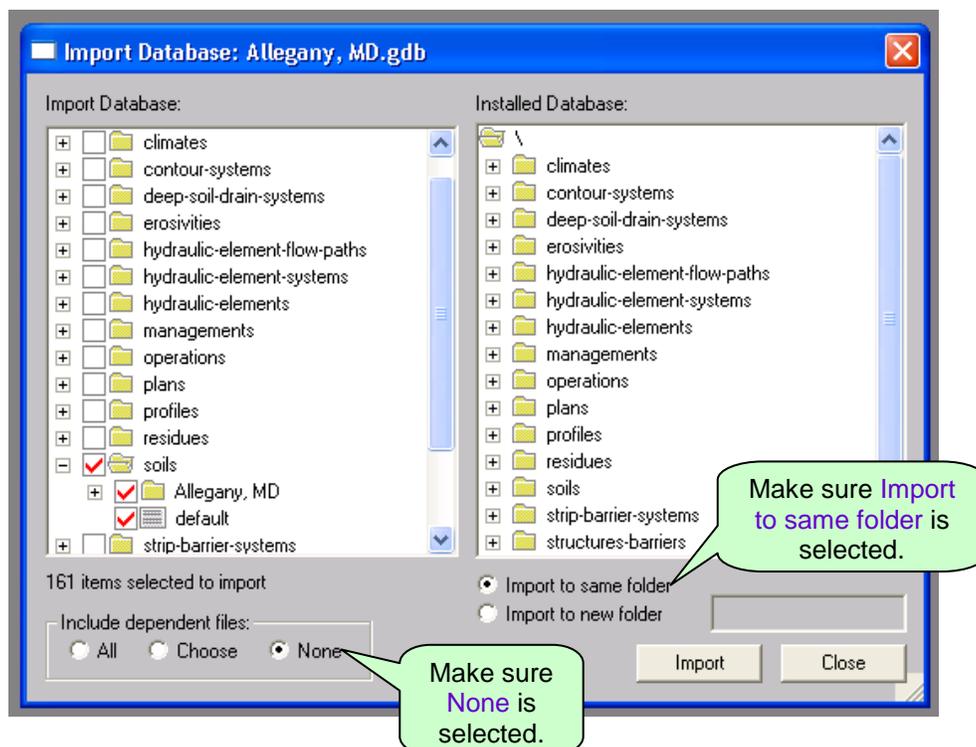
- D. Go to the Database Menu and Select “Import RUSLE2 databases...” (This is the menu used to import your climate, soils, and crop management zone databases.)



- E. An Import menu box will appear, and if you copied your files into the import folder, they should appear in the database record box. Highlight the database you want to import as shown in the example below, where the Allegany County MD soils database is highlighted. Click on Open.



- F. An import database menu box will appear. Click on the folder that you are going to import, i.e. climates, managements, soils. Select the database you want to import by clicking the folder and check the name of the database you want. In the graphic below, soils have been clicked and a check has been placed in the box in front of Allegany MD. **Make sure None is selected under Include dependent files and Import to same folder is selected.** Click Import.



G. After clicking the import button, the software will start the import process and a series of boxes will appear and then disappear. Click OK on **Import Complete** box, then click OK on the **RUSLE2** “The import is finished” box. Repeat these steps for each database you need to import.

Note:      Climate Database:      Import the entire file  
               Soils Database:        Only import counties you need  
               CMZ Database:         Only import for areas you need. Typically they will be either 65, 59, 66 and/or 4.1. You may import all if you want.



Note: there may be one less item imported than selected. This happens sometimes. Import is still complete if this occurs.



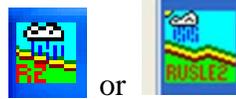
H. After the databases are imported into RUSLE2, you are ready to use the software to predict and evaluate sheet and rill erosion.

**YOU HAVE NOW COMPLETED THE INSTALLATION, IMPORT PROCESS AND DATABASE SELECTION FOR RUSLE2. YOU CAN STOP HERE OR CONTINUE IF YOU WISH TO REVIEW THE PROGRAM FEATURES AND START USING RUSLE2.**

## RUSLE2 INTRODUCTION

### Using the RUSLE2 Program

C. You can open the RUSLE2 program by clicking on the RUSLE2 icon on the Desktop.



or

OR BY

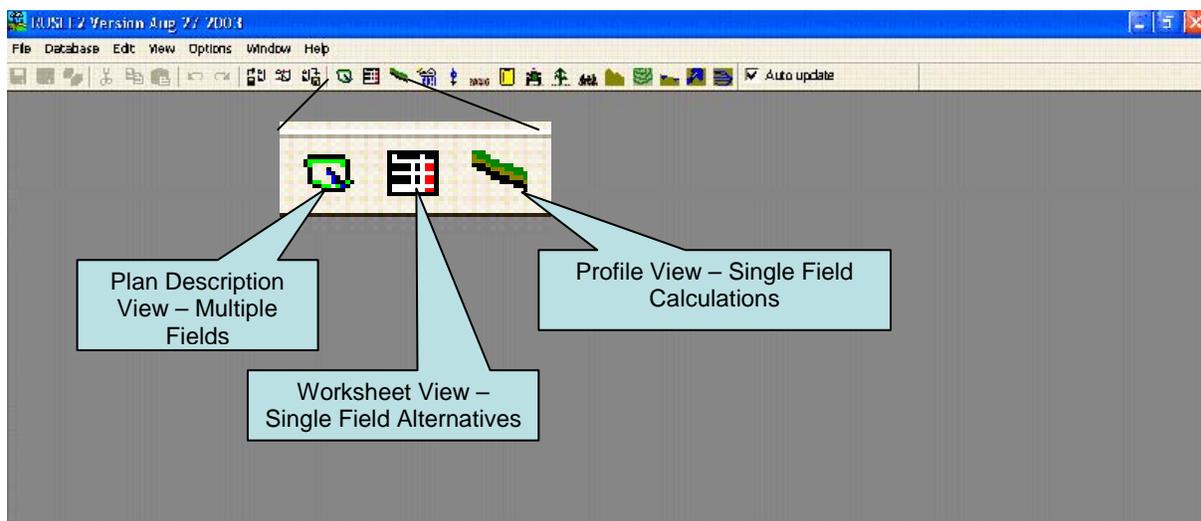
D. Clicking on Start>Programs>USDA Applications> RUSLE2

### Review program feature icons

Plan Description View – (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.

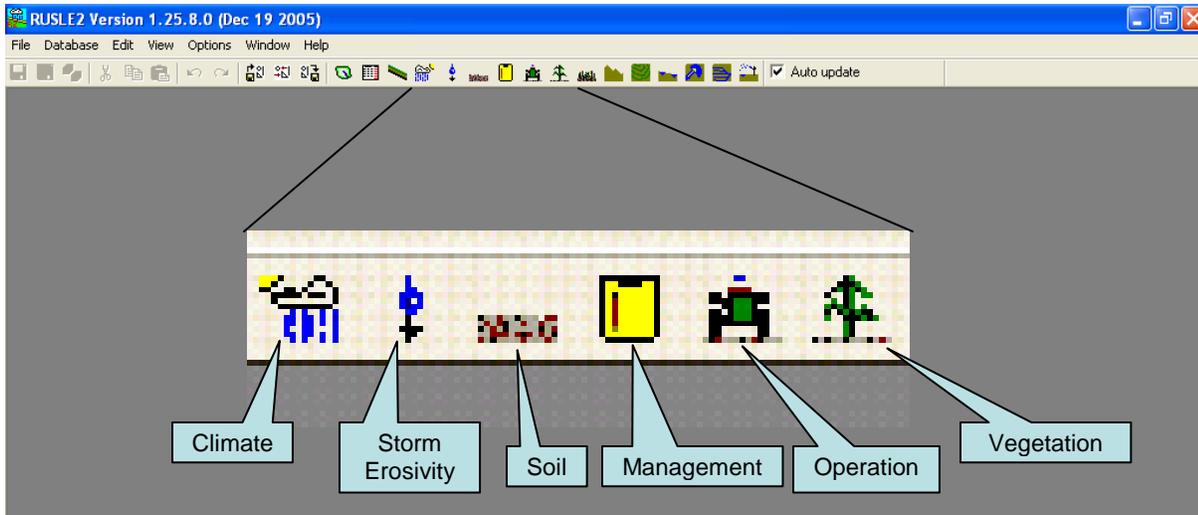
Field Worksheet View – (Data Sheet) This is the template to use to calculate soil loss alternatives for *one field or one slope*.

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



## Review program database icons

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 EI 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

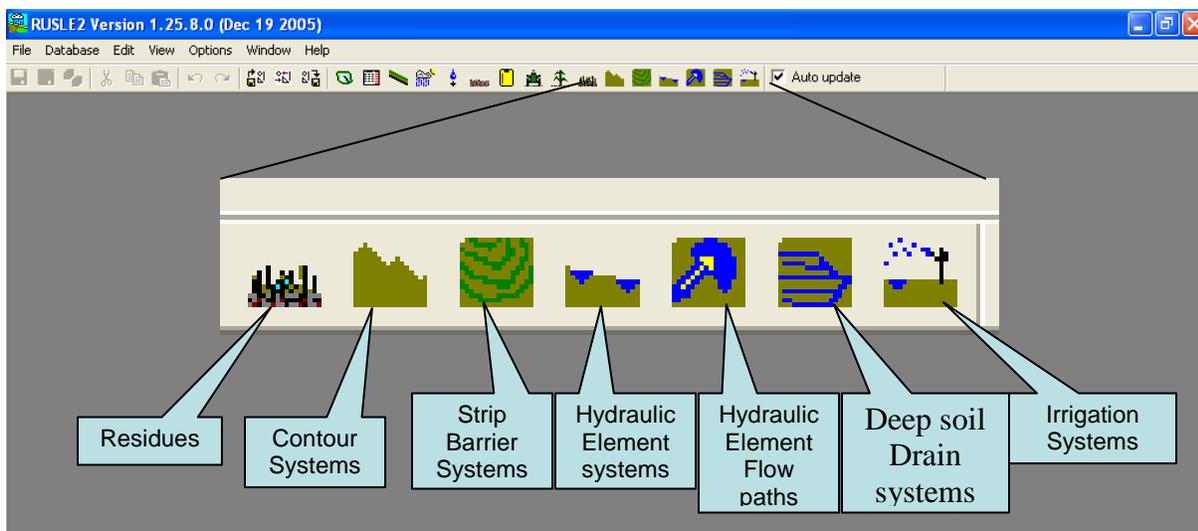
The management object contains information on management practices. Each practice typically includes a list of dates and the operations, vegetations, and applied materials like mulch and manure associated with each date. Information is cataloged in the database according to a management name chosen by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



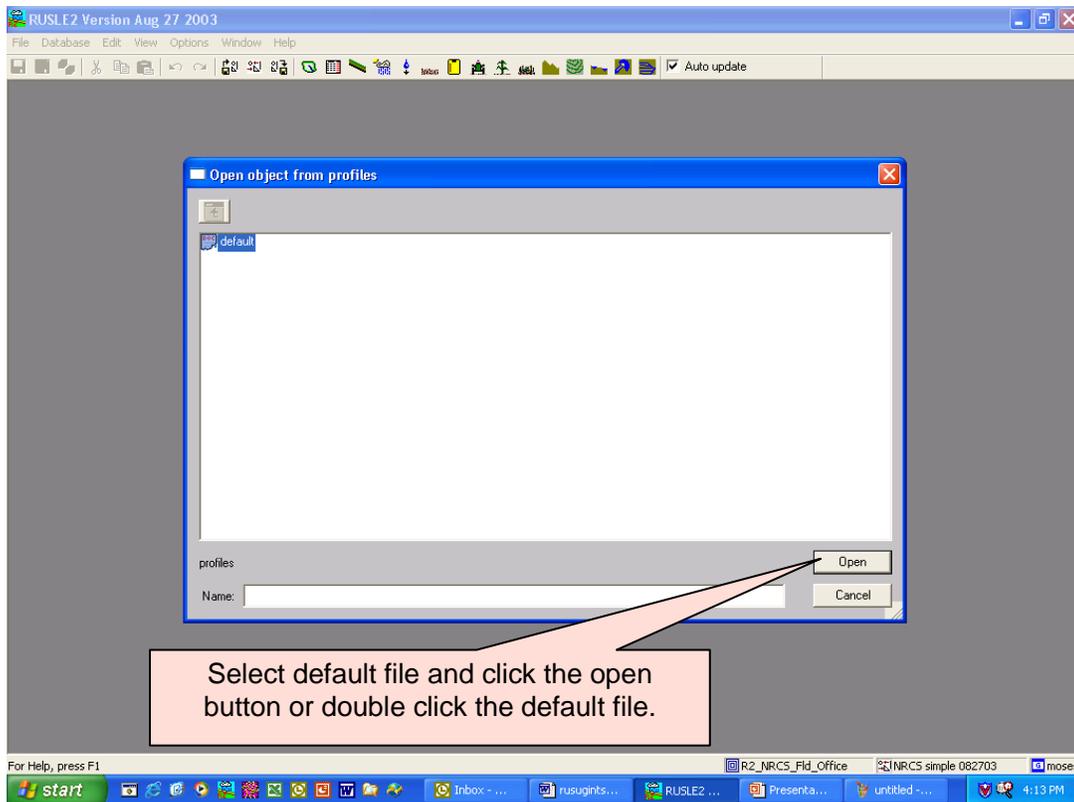
## CREATING COUNTY SPECIFIC DEFAULT TEMPLATES

**Note: This step is optional. You do not need to complete before using RUSLE2. These steps simply help the user save time when working in specific counties. If you work in many counties, you may skip this step unless you want default templates for areas you are working in.**

Creating county specific templates of the PLAN, WORKSHEET, and PROFILE views now will save you time later for each instance you need to calculate sheet and rill erosion. First, open the PROFILE view by doing a single left click on the PROFILE view button (sloping line).

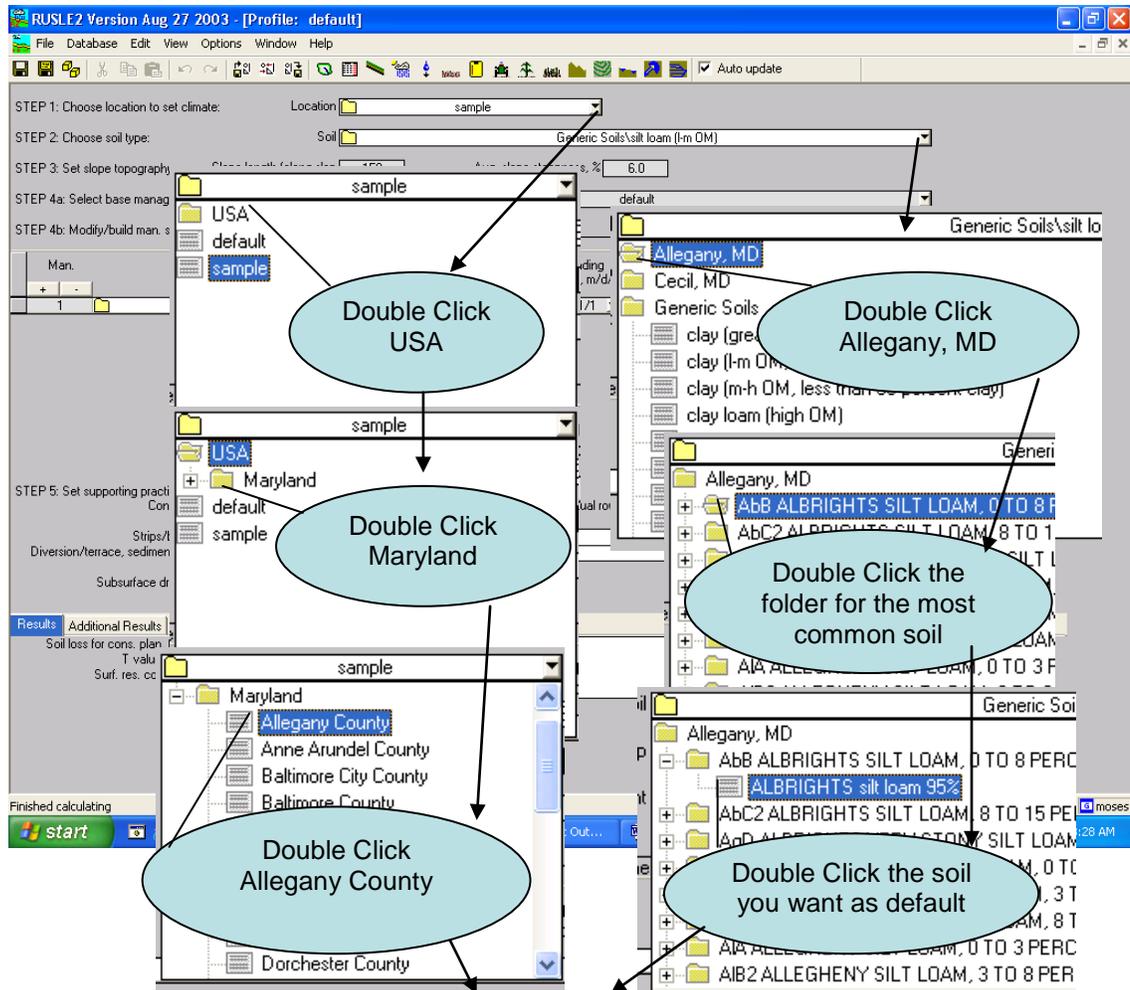


The following screen will appear. Click on the default template file and click open or double click on the default file. NOTE: Allegany County, MD, will be used in the following examples. When creating your county defaults, select your appropriate county data, and save appropriately.

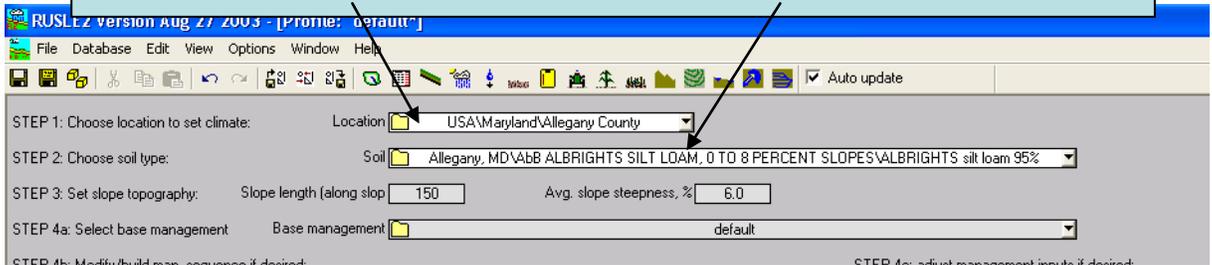


After opening the PROFILE view, click the drop down for the location. Double click the USA folder. Then double click the Maryland folder. Scroll through the county files and select the appropriate county climate data files. Double click on the appropriate county file.

Do the same procedure for soil type. Click the drop down box for Soil Type. Scroll through the list and select the appropriate county soil survey. Double click on the county name. Scroll through the list of soil name folders and select one (most commonly used in your county). Double click on the soil folder to open and select the appropriate soil file. Double click on the soil file to populate the soil type box. Procedure is shown below for Allegany County as an example.



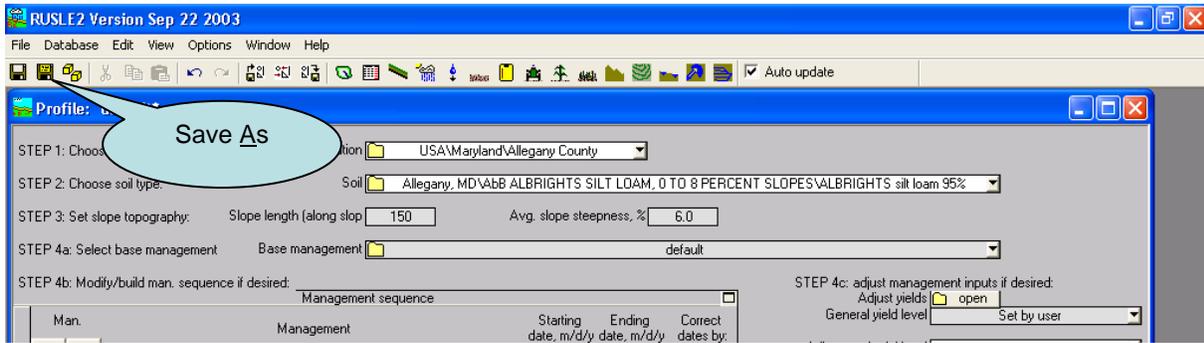
Notice the Allegany County Climate, and the Albright Silt Loam Soil is populated below.



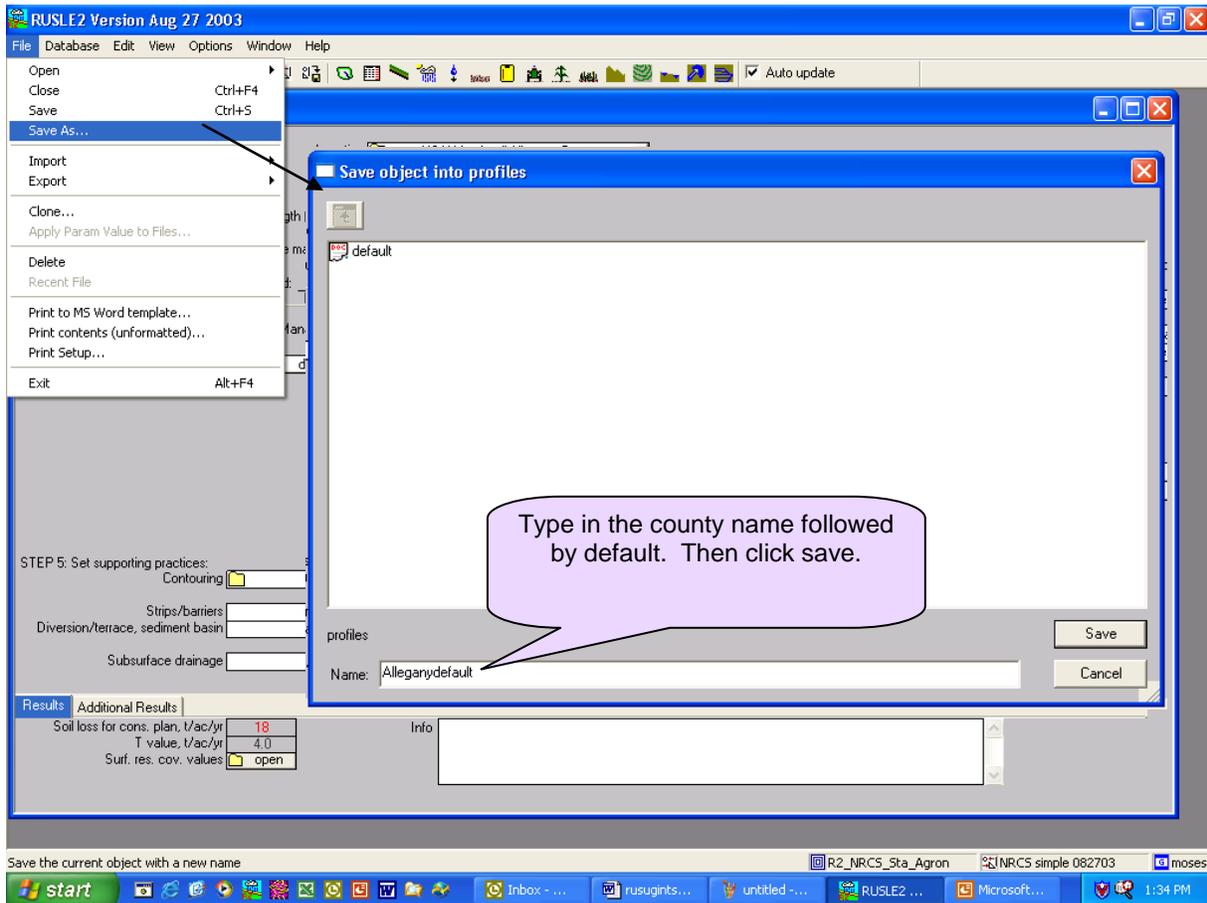
You have created a county specific template for a PROFILE; however, it must be saved for future use. Select the File menu option and scroll down to Save As and single left click. (Or...you may click on the shortcut button that has a disk with a yellow label on it, second shortcut button from the left.)



A “save objects into profile” box will appear. Type your county name in the name box at bottom of the screen followed by default and press the **Save** button. Example: Allegany\_default. You now have created a default template to be used whenever you need to do a PROFILE view calculation, or rotation. The procedure is shown below.



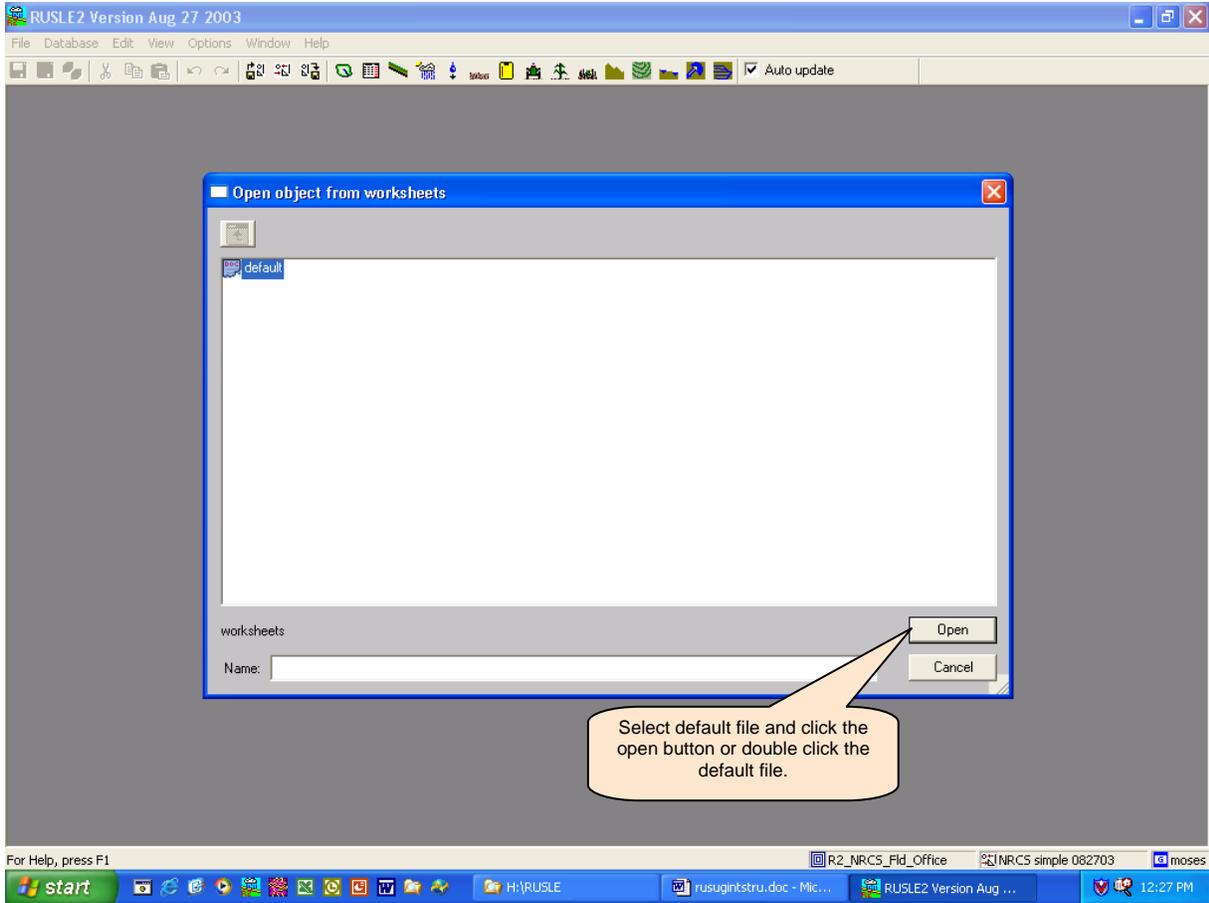
Or...



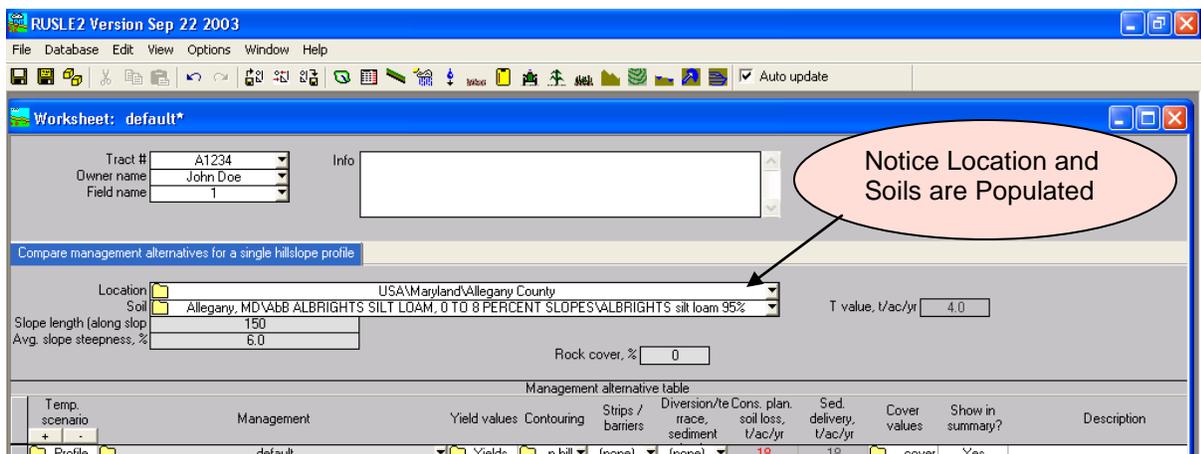
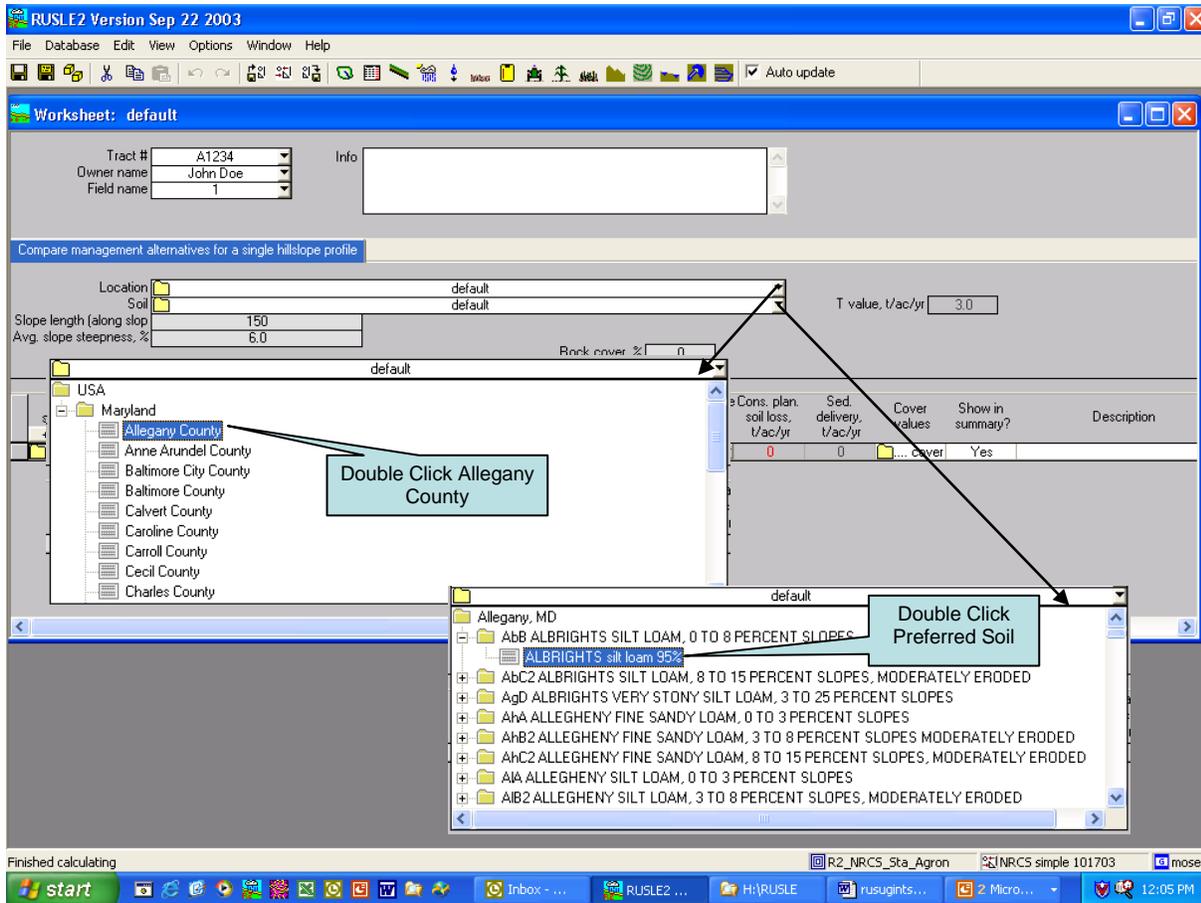
Follow the same procedure to create a county specific WORKSHEET Template. Open the WORKSHEET View by doing a single left click on the WORKSHEET view button (data sheet).



The following screen will appear. Click on the default template file and click open or double click on the default file.



Follow the same procedure to populate the location (climate data) and soils as you did for the PROFILE template. Follow the steps in the following pictures.

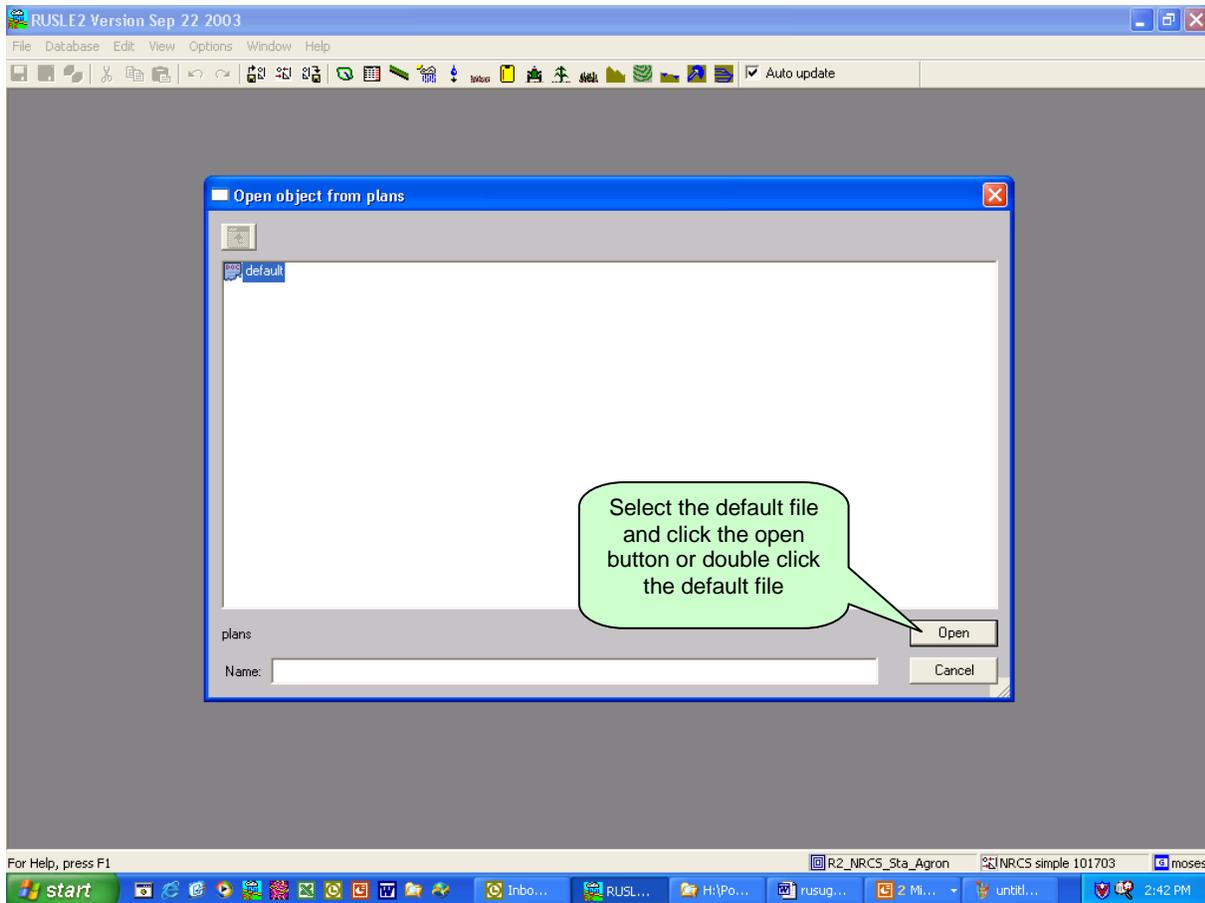


You have now created a county specific WORKSHEET template. It must be saved for future use. Select the File menu, scroll down to Save As and do a single left click or single left click on the Save As shortcut button on the toolbar. A “save objects into worksheets” box appears. Type the county name followed by default (for example, Alleganydefault) and press the **Save** button. You now have created a default template to be used whenever you need to do a WORKSHEET view. (The procedure is the same as shown for profile. See picture on page 24.)

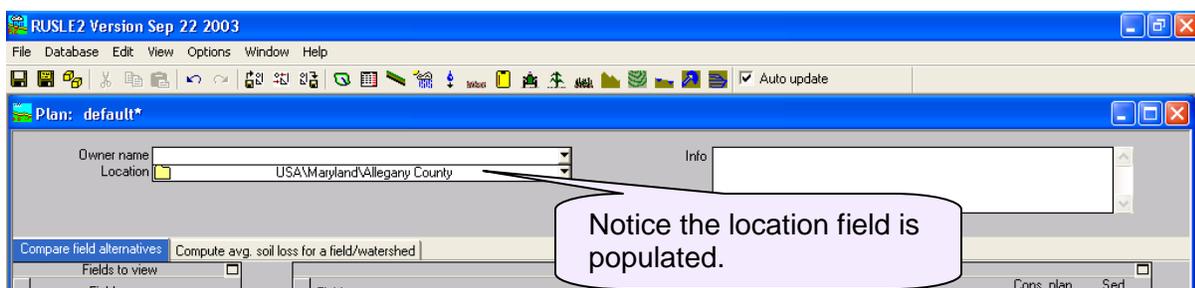
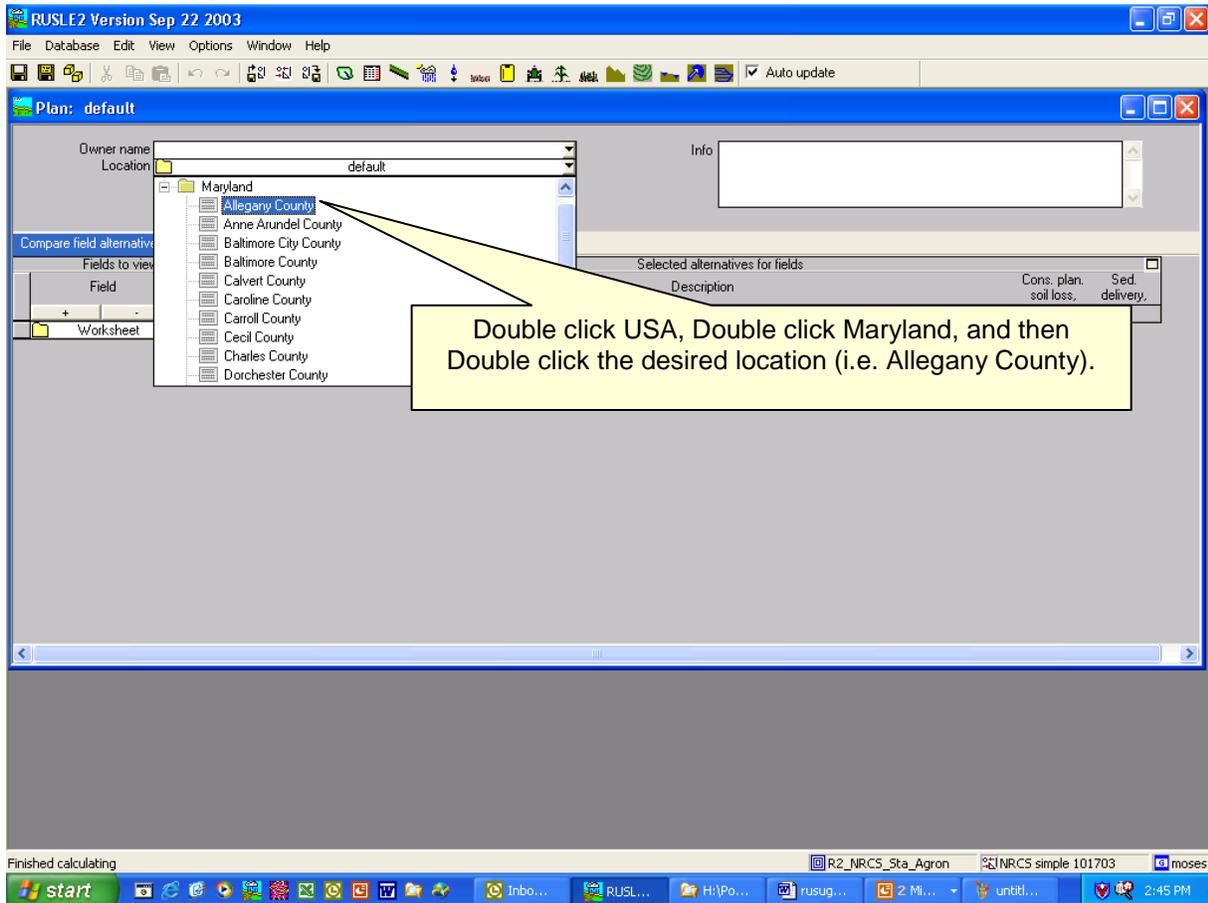
Follow the same procedure to create a county specific PLAN Template. Open the PLAN View by doing a single left click on the PLAN view button (green watershed, looks like a leaf).



The following screen will appear. Click on the default template file and click open or double click on the default file.



Follow the procedure pictured below, which is almost the same procedure as for a PROFILE and/or WORKSHEET template.

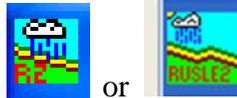


You have created a county specific template for a PLAN, to be saved for future use. Select the File menu option and scroll down to Save As and do a single left click. A "Save objects into plans" box will appear. Type your county name in name box at the bottom of the screen followed by default (for example, Alleganydefault) and press the save button. You now have created a default template to be used whenever you need to do a PLAN description view.

|                          |
|--------------------------|
| USING THE RUSLE2 PROGRAM |
|--------------------------|

## Starting RUSLE2

Open the program by clicking on Start>Programs>USDA Applications>Select RUSLE2, or by clicking on the shortcut button:



Before you can calculate soil loss for a field or multiple fields, you must first build the producers crop rotation by using the Crop Rotation Management Screen. This is the first step in calculating soil loss.

## Building a single or multi-year crop rotation

Specific crop rotations will provide for a more accurate calculation of the RUSLE2 Soil Conditioning Index and Total Soil Loss. One method of developing a multi-year crop rotation is provided below with step-by-step instructions. Please note: There are many ways to develop a multi-year crop rotation. This is only one method. I have found this to be the easiest and most error free.

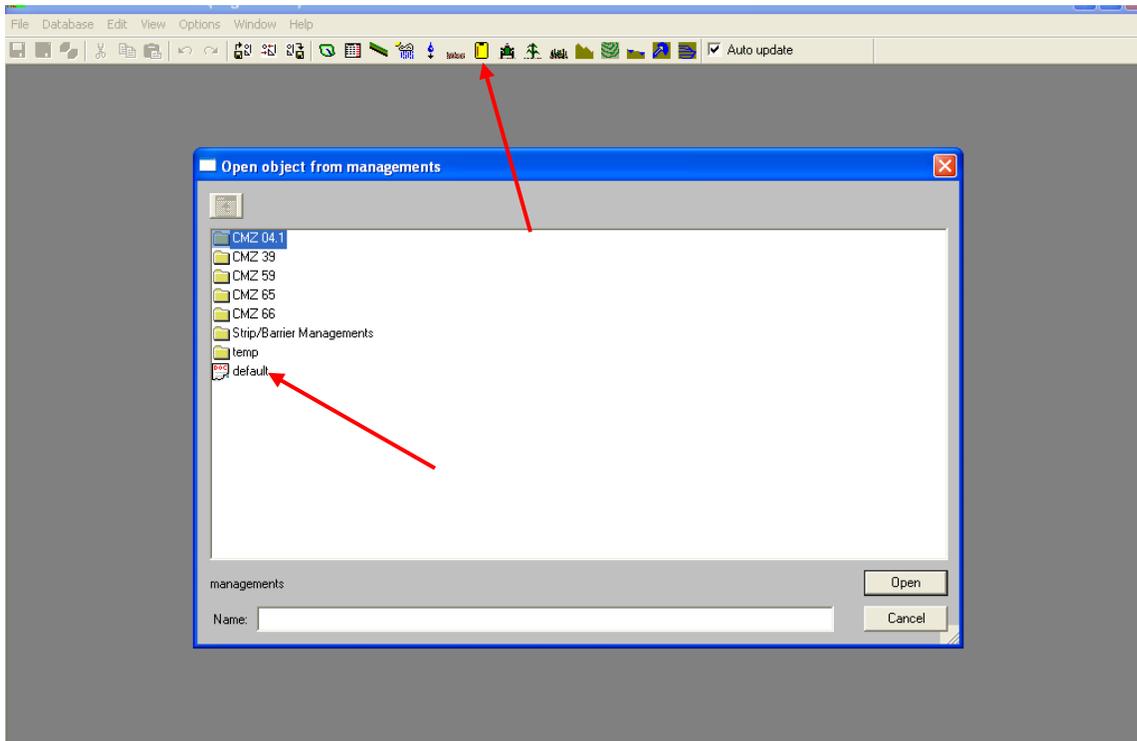
**Step 1:** Start by thinking about what type of rotation you want to build. Multi-year crop rotations are usually very similar each year with only a few minor changes associated in the rotation. For this example we will build the following crop rotation:

Corn – Grain, chisel plow in the fall with two diskings in the spring before planting.

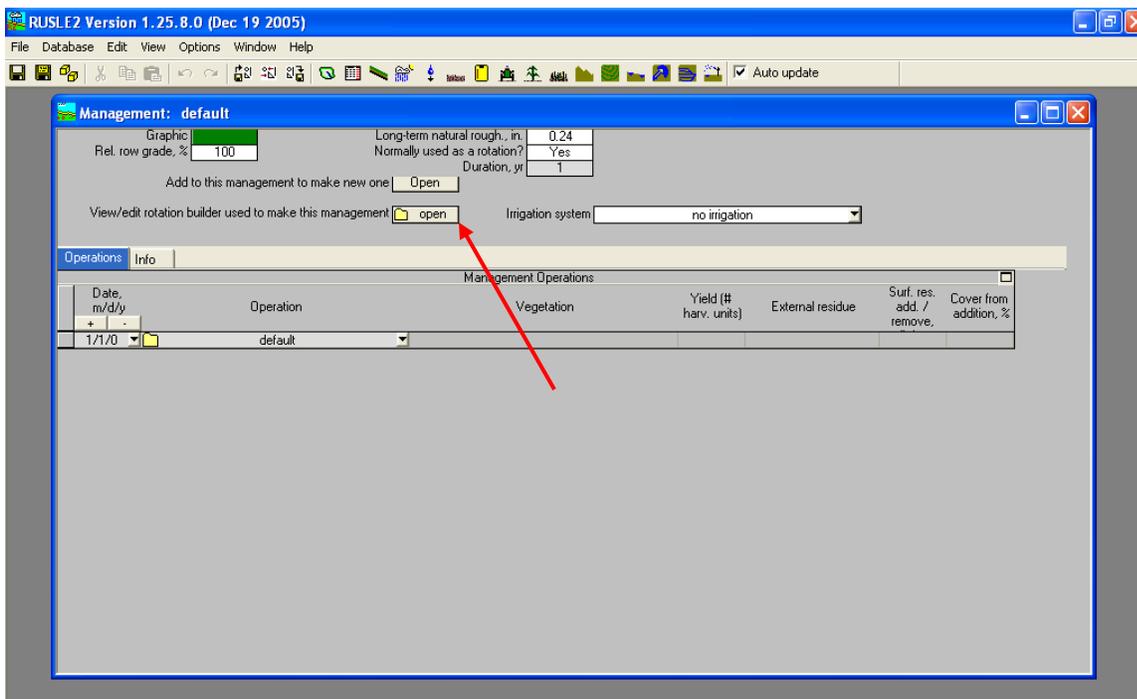
Wheat – disk once in the fall before planting.

Soybeans – Double Crop after wheat, no-tilled.

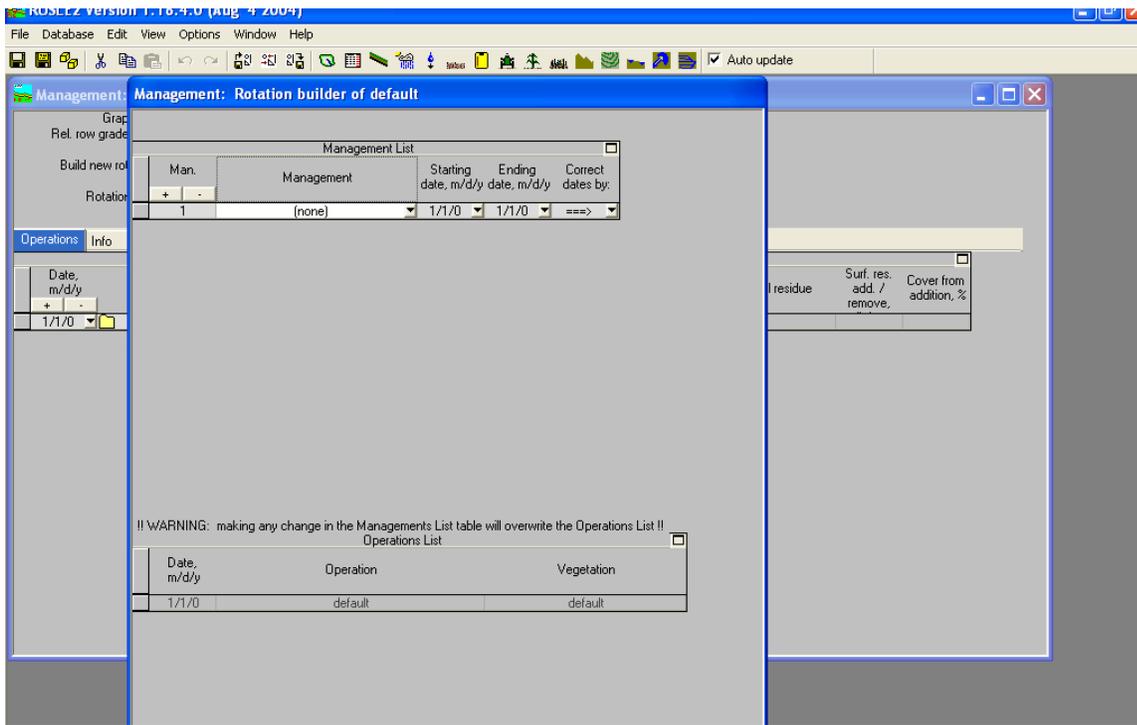
Start by opening the Crop Rotation Management Screen (yellow folder) and double click on default.



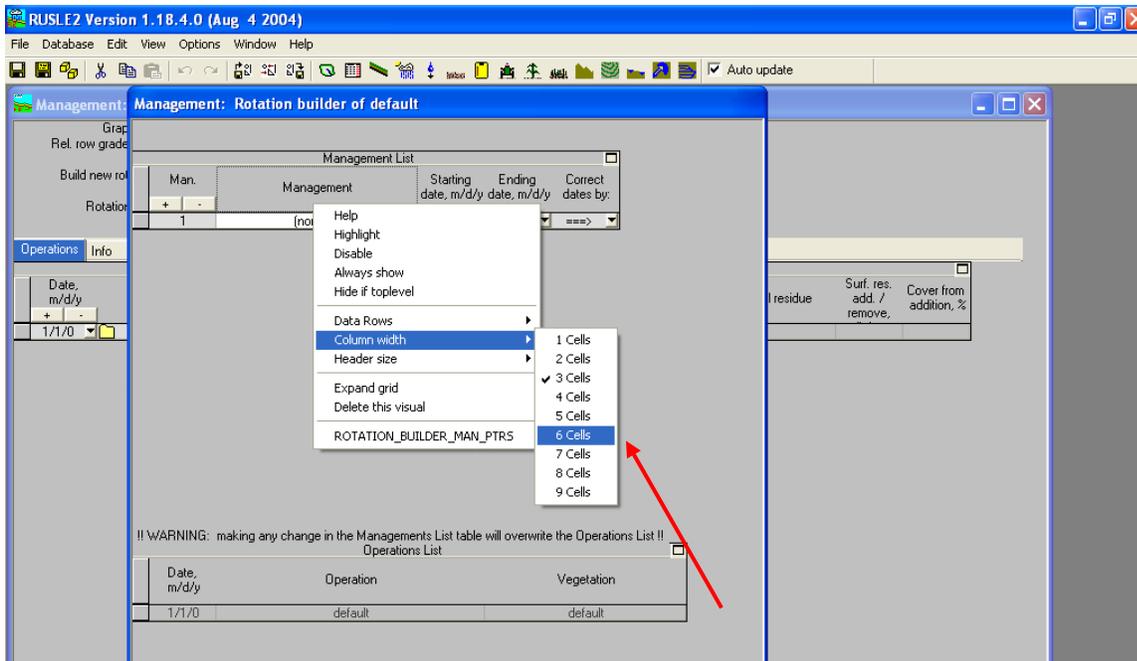
**Step 2:** This will open up the Crop Rotation Management Screen. From here, click on “View/Edit Rotation builder used to make this management”. This will open up the crop rotation builder screen where you complete the actual build.



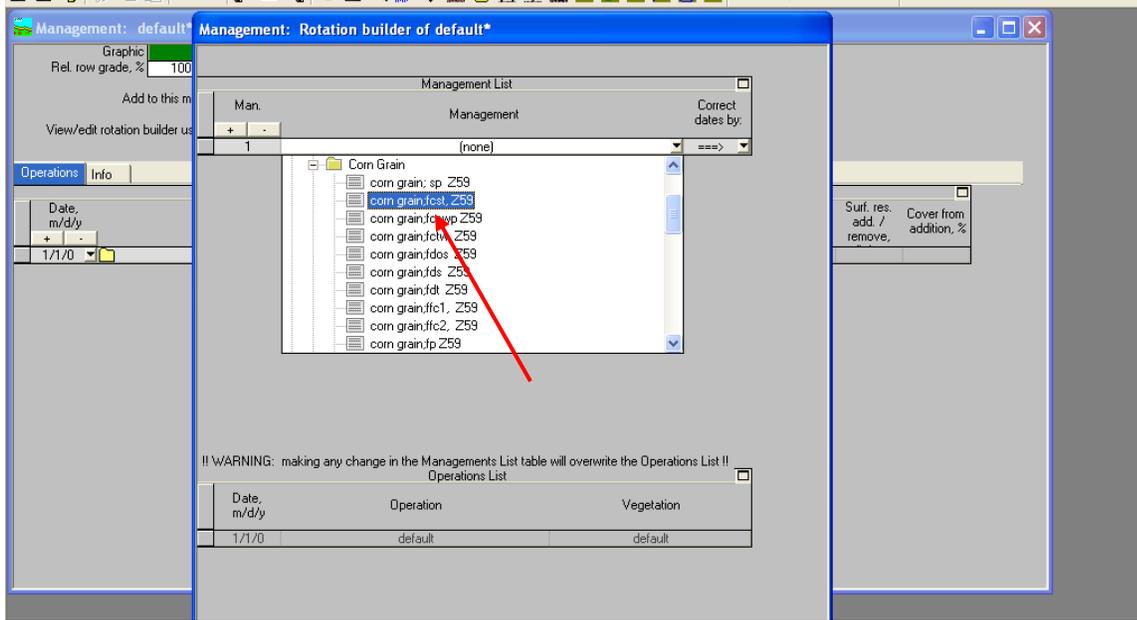
Rotation builder of default screen. This is the screen where you complete the actual build of the crop rotation.



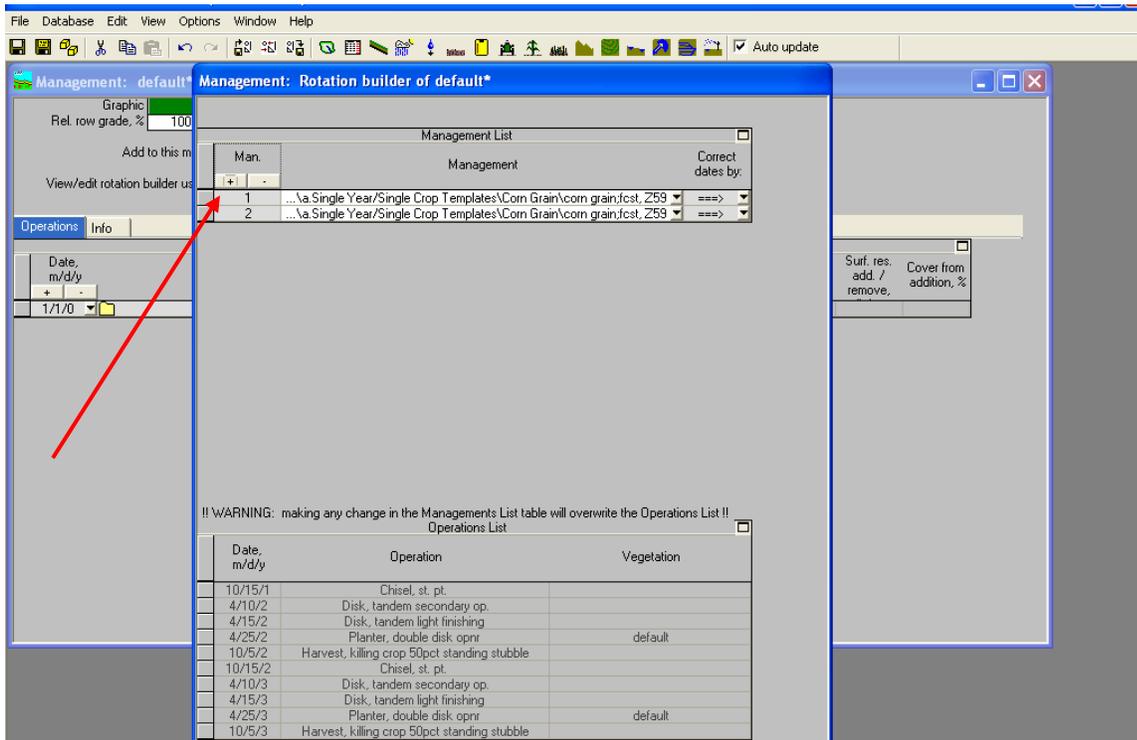
**Step 3:** Expand the Management List column of this screen so that it will be easier to build the crop rotation and see exactly what you are doing. Do this by moving your cursor just above the Management column (a black down arrow will appear), right click and scroll down to Column width. By default the program column is set to 3 cells. Change this to 6 or 7 cells.



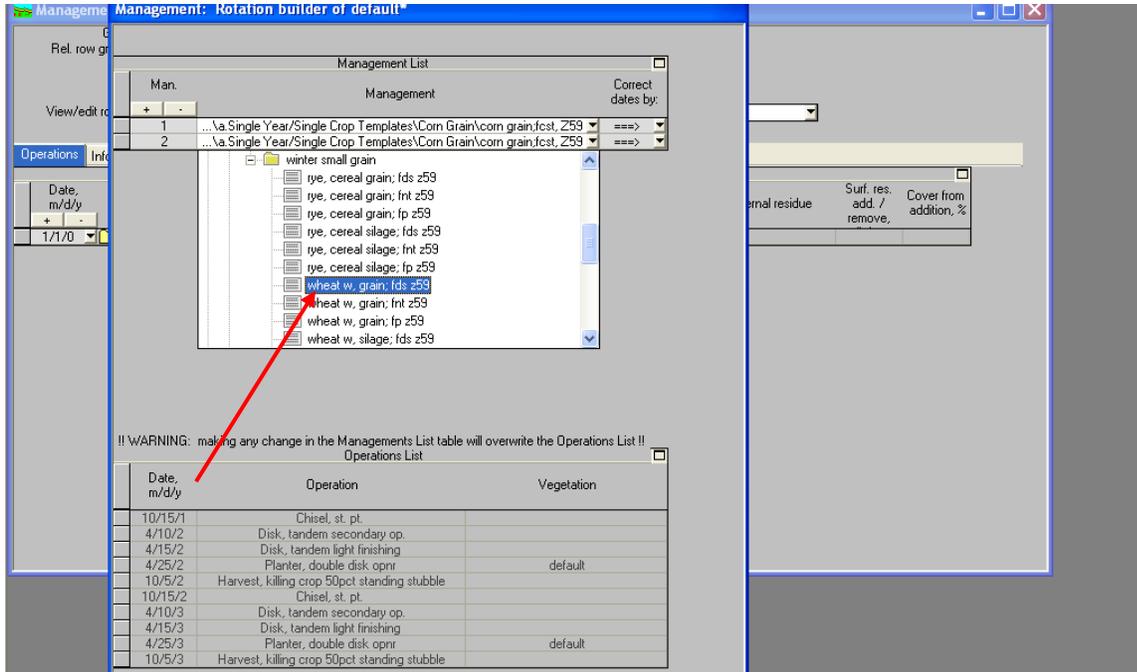
**Step 4:** Next we will choose our first crop of the rotation. Click on the Crop Management Zone (CMZ) of your choice and choose your first crop. In this example we have chose CMZ 59 / A: folder, Single year; single crop templates / Corn / fall chisel straight shank (corn grain,fcst). Double click on this crop selection.



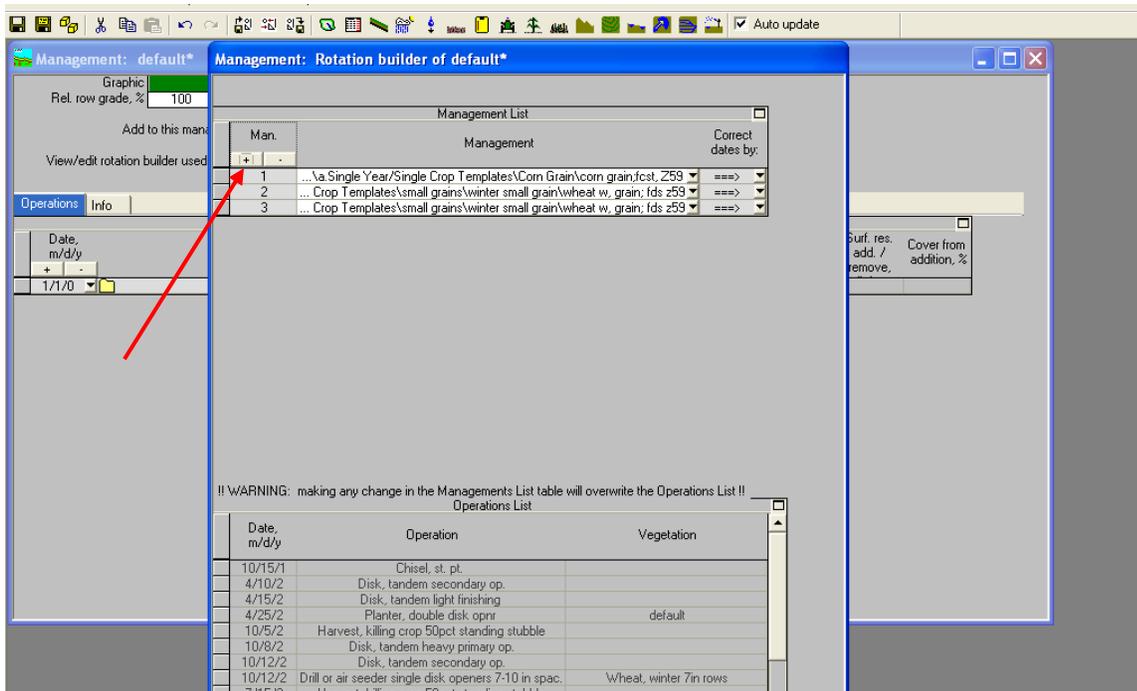
**Step 5:** Next click on the plus (+) sign under Man column to add another row to the crop rotation. Note: By default RUSLE2 makes an exact copy of the crop selected above.



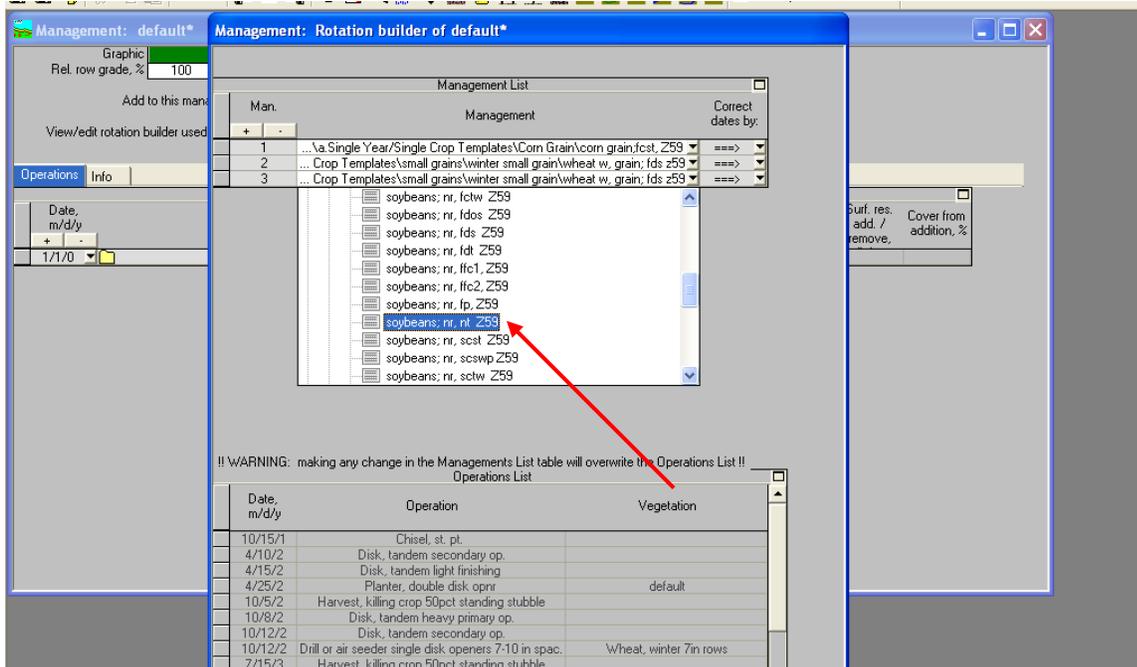
**Step 6:** Next we will choose our second crop of the rotation. Click on the drop down menu to the right of Management 2. In this example we will choose CMZ 59 / A: folder, Single year; single crop templates / Winter small grain / wheat w, grain; fds, Z59. Double click on this crop selection.



**Step 7:** Next we will choose our third and final crop of the rotation. Click on the plus (+) sign under Man column to add another row to the crop rotation. Note: Again, by default RUSLE2 makes an exact copy of the crop selected above.

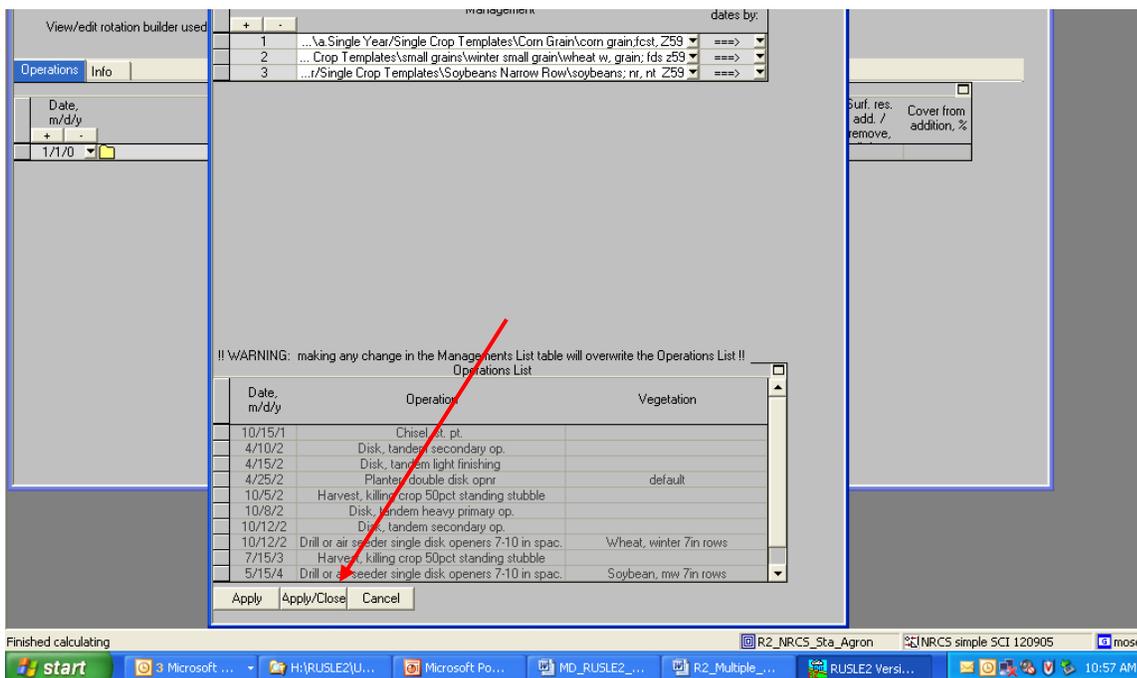


Click on the drop down menu to the right of Management 3. In this example we have chose CMZ 59 / A: folder, Single year; single crop templates / Soybeans Narrow Row / soybeans, nr,nt, Z59. Double click on this crop selection.

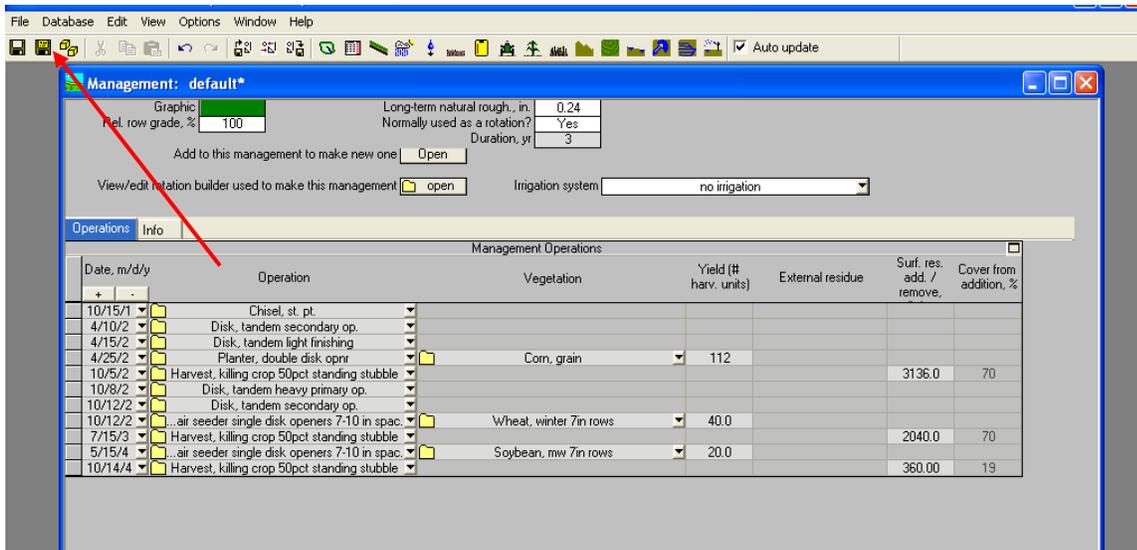


You have now developed your multi-year crop rotation.

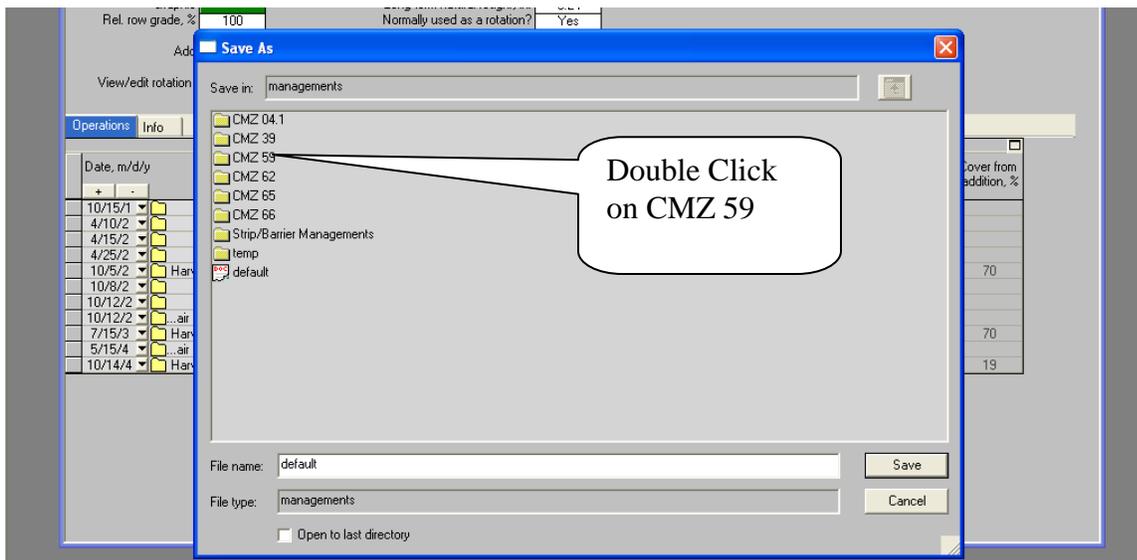
**Step 8:** Click “Apply/Close at the bottom of the Management List Screen. This screen will close and take you back to the Management or Results screen.

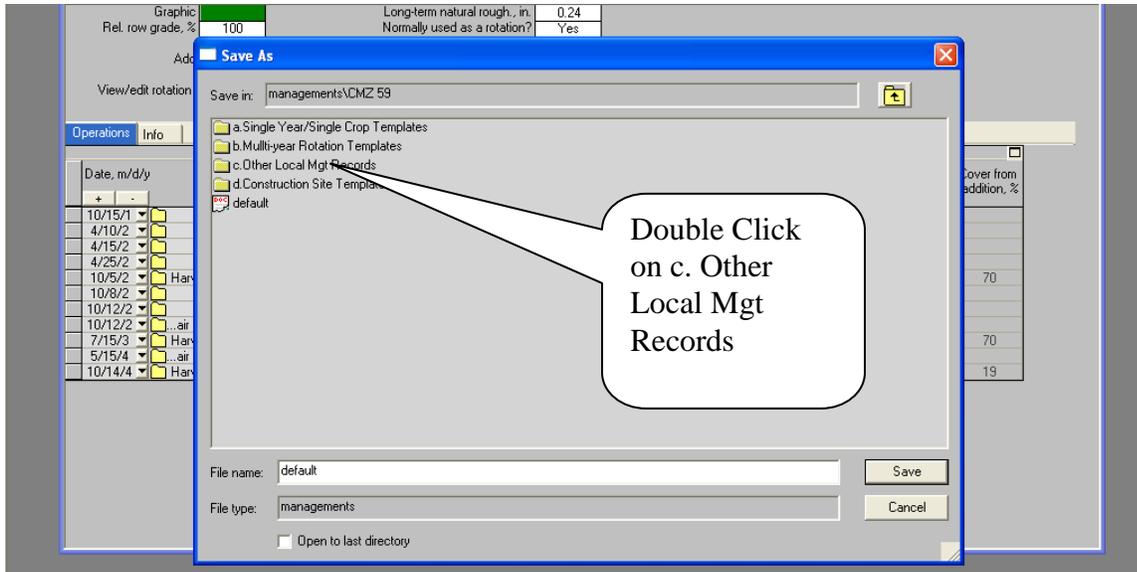


**Step 9:** Next we will save the rotation in your C: folder and give it a name. You must save crop rotations you built in your C folder of RUSLE2. You cannot save in any other location except the C folder. See screen shots below. For this example we will save it as Example Farm. To save this rotation to your C:folder / Other local management records, first click the “Save As” button.

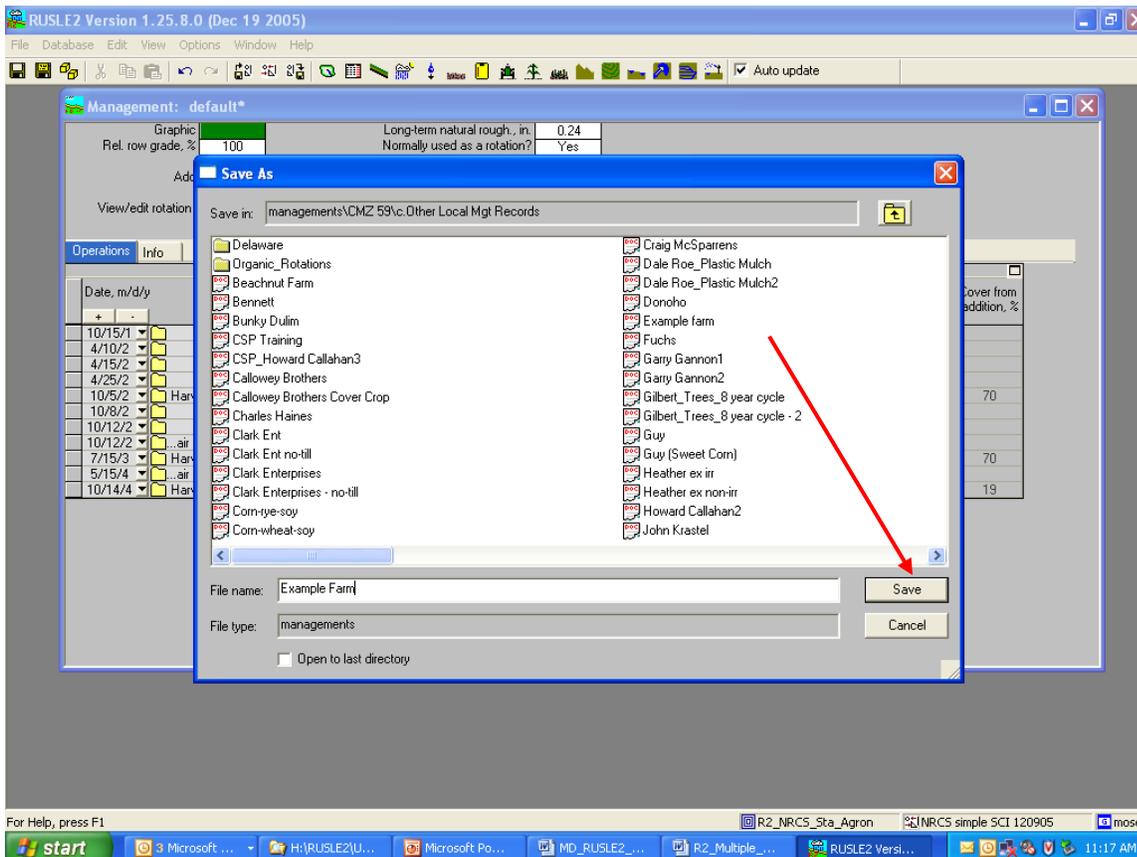


Next navigate to your C folder for the CMZ you wish to save the file in. In this case, since this crop rotation was created using CMZ 59, so we will navigate to its C folder.





Next, name the crop rotation. In this example the name is “Example Farm”. Save the rotation as Example Farm to your C:folder / Other local management records.



**Step 10:** Exit from the Management Screen. You should now have a blank screen. Your crop rotation that you built is now saved for calculating soil loss for a field/farm. See “Applying a single or multi-year crop rotation for calculating soil loss” of this guidance document.

## **Applying a single or multi-year crop rotation & Calculating soil loss**

**Step 1:** In the introductory screen, click the ‘PLAN view’ shortcut button.



This is the screen that can be used to calculate soil loss for multiple fields with multiple scenarios. It is the screen that should be used for whole farm conservation planning. We will use the ‘PLAN view’ to provide instruction on how to use RUSLE2. The other calculation views (WORKSHEET and PROFILE) follow a very similar process and are also utilized during the PLAN view.

**Step 2:** Select a Starting File.

In the “Open Objects From a plan” dialogue box, click on the file you wish to start. If you are starting for the first time, select the county specific default. Click Open or double click the file name.

**Step 3:** Owner Name or Client Name.

Click on the drop down arrow. A box will appear where you can type in the client name(s).

**Step 4:** Location. (Other than the county specific default)

If using the county specific default, then skip this step. Click on the drop down arrow. Navigate down the files, open your state, then scroll down and double click the county/climate file you want.

**Step 5:** Save this Template. (Optional)

At this point or anytime after this, you can save this template/management system so that you can later start with this template and the location you selected will already be entered when you open the template.

Click File>Save As>

In the name blank of the dialogue box, type in a name you would like to call this template. Click Save. **This is now saved for future use.**

**Step 6:** Info Box (Upper Right of Screen)

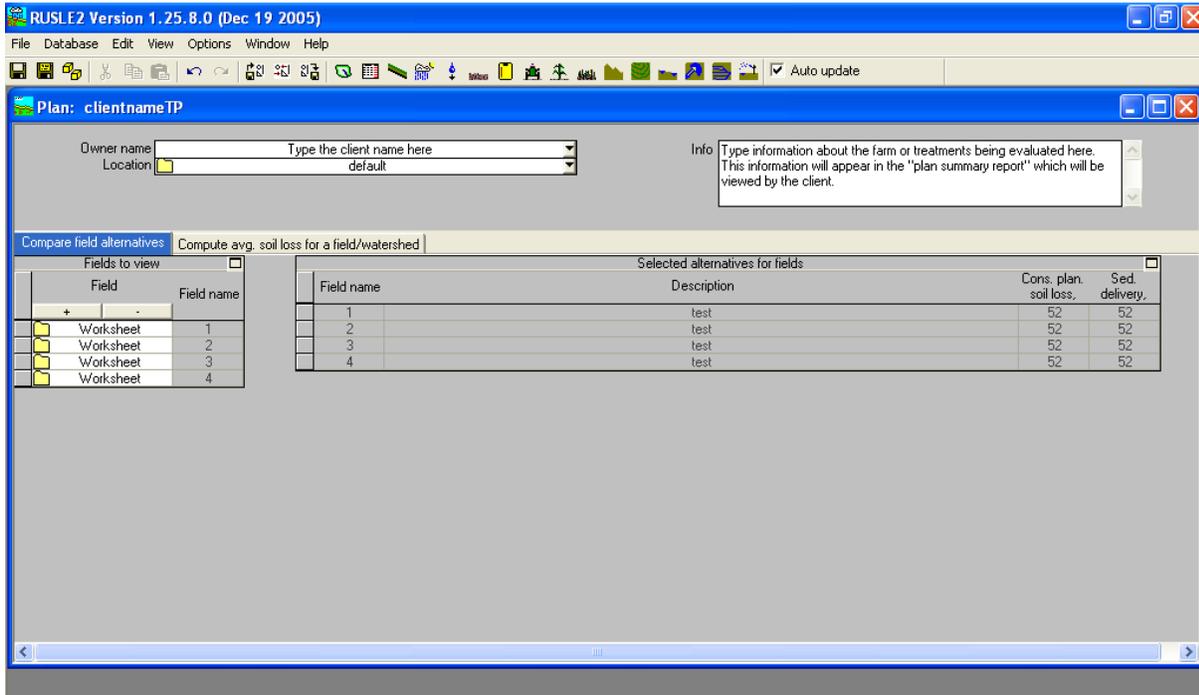
Place your cursor in the box, click once, and then type a description of the fields or treatment units being evaluated. This will be helpful information for the future. The information entered here will appear in the Report Printout that will serve as your permanent record.

**Step 7:** Add Fields. (Plan View)

In the box titled 'List of fields', click the + sign to add the number of fields that you wish to calculate soil erosion for. To delete extra fields, highlight the worksheet/field row, and then click on the – sign. Note: Field names/numbers will be changed later. (The example will have 4 fields.)

**Step 8:** Save As. (Plan View)

Click on the Save As icon or on File>Save As. Save the PLAN whatever you want to call it. For example, type in the client name followed by your initials. (e.g. clientnameTP) You will notice that the title bar now shows what view you are in and the name of the saved PLAN.

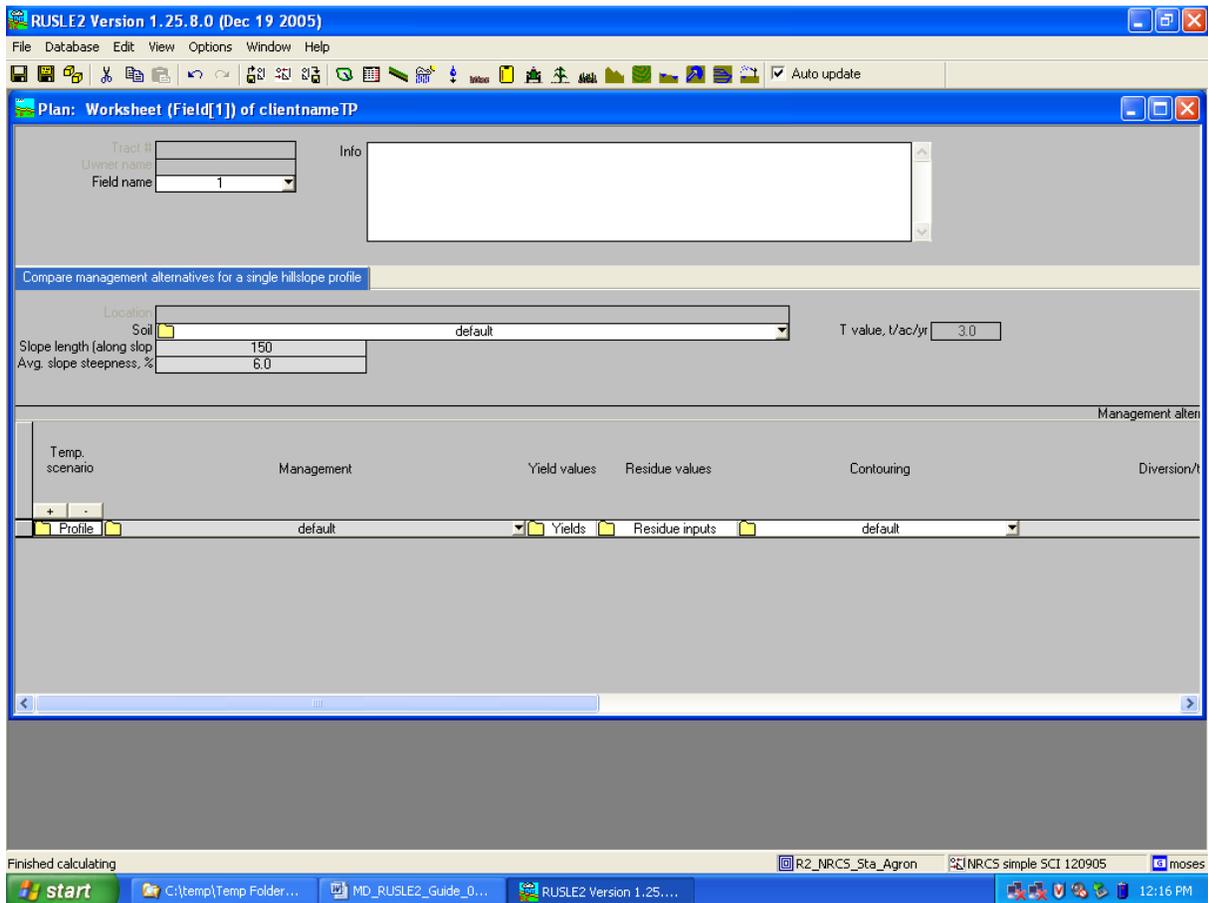


## WORKSHEET VIEW

You must now utilize the WORKSHEET view from within the PLAN view to evaluate different alternatives for each field. You will later utilize the PROFILE view from within this WORKSHEET view to calculate the different alternatives.

### Step 9: Enter Field Names and Data. (Worksheet View)

In the box, 'Fields to View', click on the **yellow folder** next to the word Worksheet. This will open the WORKSHEET view where you can enter the field name/number and data for that field.



**Field Name:** Click on the drop down arrow. A text box will appear in which you can delete the “1” and type in the name or number of the field to be evaluated.

**Info box:** Click in the white box and type in any information about that field you deem important and may need to know in the future.

Soil (Other than county specific default): Use the drop down arrow to navigate to the county soil database, then down to the soil map unit that best represents the field being evaluated. Double click on the map unit to enter. Note: You will need to click on the + sign in front of the soil folder to open that folder. Some map units have more than one component, and you will need to select the map unit component that best fits your field situation.

Slope Length (ft): Type in the measured length of slope (e.g., 150).

Avg. Slope Steepness (%): Type in the measured slope % (e.g., 3 %).

Tract #   
 Owner name   
 Field name

Info Type information you may need later, here.

Compare management alternatives for a single hillslope profile

Location   
 Soil   
 T value, t/ac/yr   
 Slope length (along slope)   
 Avg. slope steepness, %

| Temp. scenario | Management | Yield values | Residue values | Contouring | Diversion/t |
|----------------|------------|--------------|----------------|------------|-------------|
| Profile        | default    | Yields       | Residue inputs | default    |             |



Save: Click on File>Save or use the save shortcut button.

Note: Notice that when you make changes to the PLAN view, an asterisk (\*) appears on the title bar after the name. This asterisk lets you know that you have made changes to the file but have not yet saved the file. The asterisk will disappear once you save the file. Make sure that you always save if an \* appears on the title bar in order not to lose data changes.

## Adding or Deleting Attributes on the “Worksheet View”

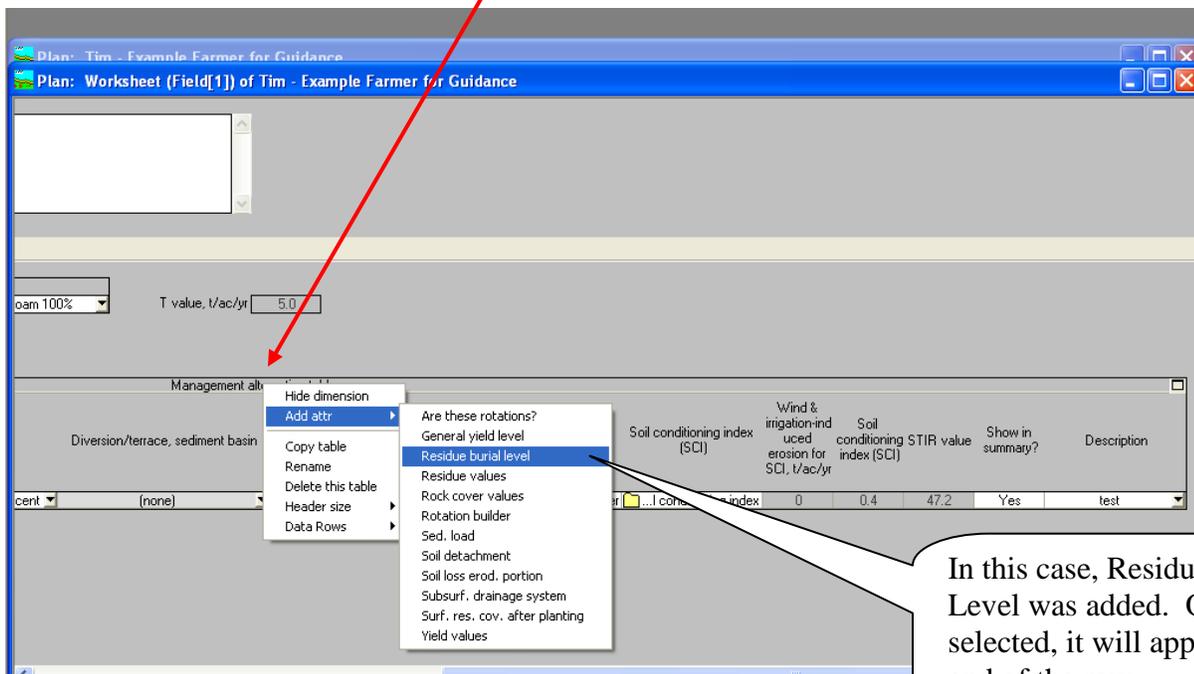
Some of the “attributes” e.g. diversions/terraces are not needed in your location or you may wish to add one to make the worksheet more useful for your location. Attributes can be added and deleted at any time – if you delete one then want to add it back it can be done.

### To delete an attribute:

- 1<sup>st</sup> Click on an attribute title e.g. Cover Values.
- 2<sup>nd</sup> Right click and select – Delete this visual.

### To Add an Attribute:

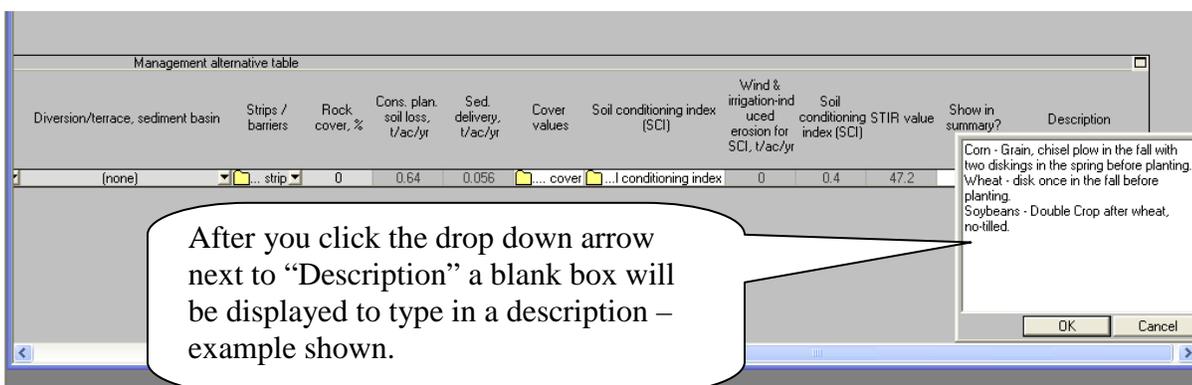
- 1<sup>st</sup> Right click on the words “Management Alternative Table” then select Add Attr.
- 2<sup>nd</sup> From the choice list provided from Add Attr select the attribute you wish to add.



In this case, Residue Burial Level was added. Once selected, it will appear at the end of the row.

### Description

Type in a short description of the rotation system. The results will be shown on the Description and will be displayed in the printout report.



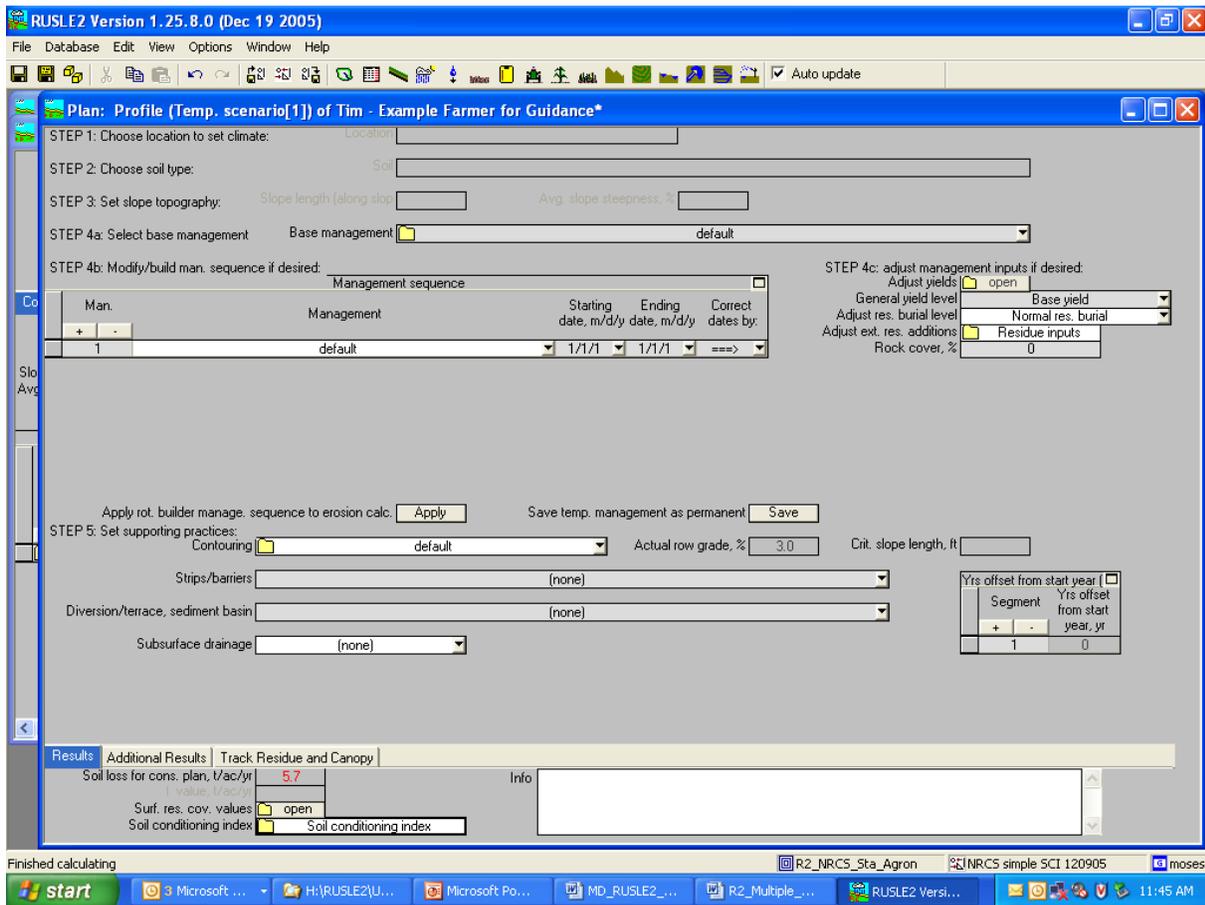
After you click the drop down arrow next to “Description” a blank box will be displayed to type in a description – example shown.

**PROFILE VIEW**

The best way to calculate RUSLE values for the alternative crops that a producer is considering is to utilize the PROFILE view from within the WORKSHEET view that was opened from the PLAN view. (Got it?) The following steps outline how to do this.

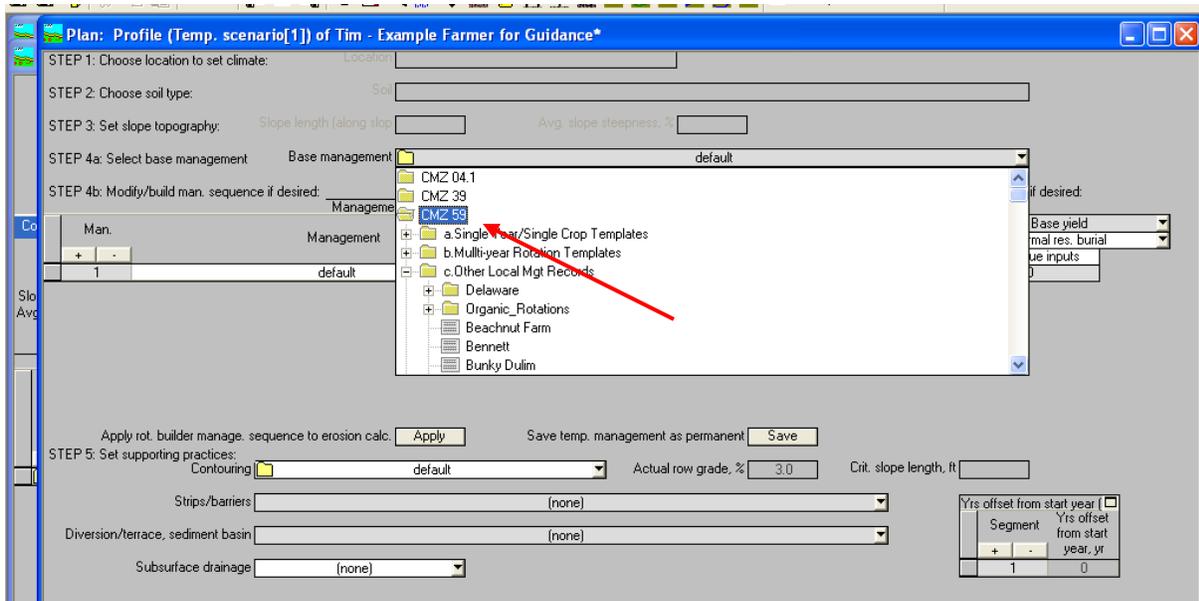
**Step 10: Open the Profile View.**

Click on the **yellow folder** just to the left of the word Profile in the WORKSHEET View. The PROFILE view will appear in another window.

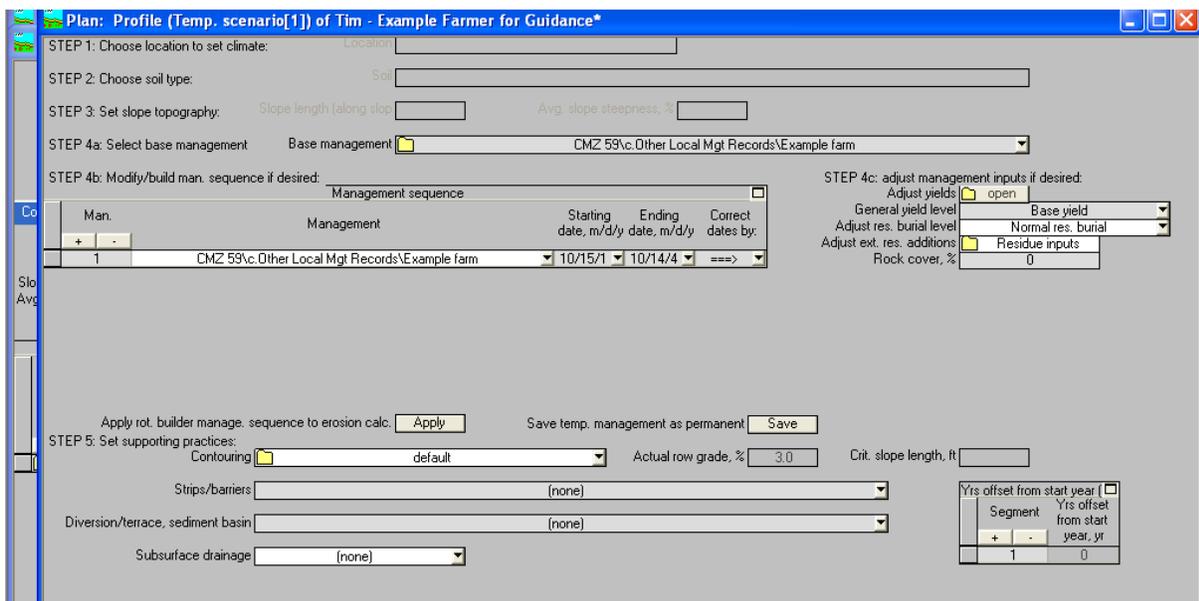


### Step 11: Base Management (Profile View)

Click on the arrow for the drop down menu on Step 4a: Select base management. Scroll down the drop down menu and double click on the appropriate CMZ. Remember, we built the example crop rotation in *Building a single or multi-year crop rotation*. We created a file called “Example Farm”. So for this example, navigate to CMZ 59 / C folder / Example Farm. Click on this to enter the crop rotation.

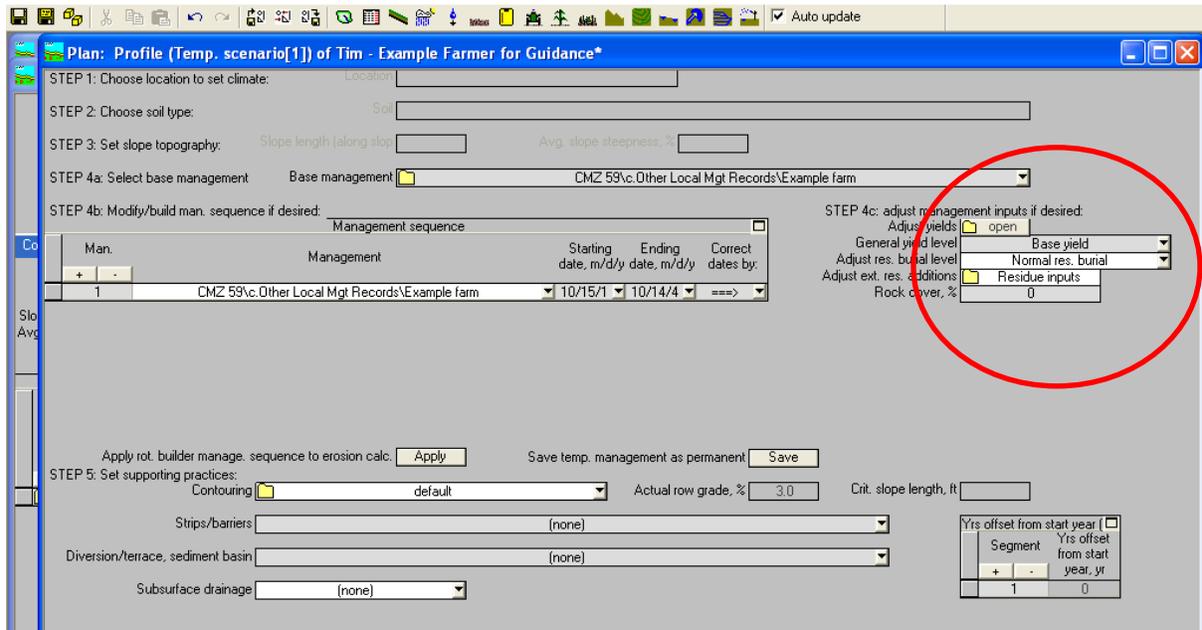


Navigate to “Example Farm” and Double Click. This will enter the “Example Farm” crop rotation in section 4a.



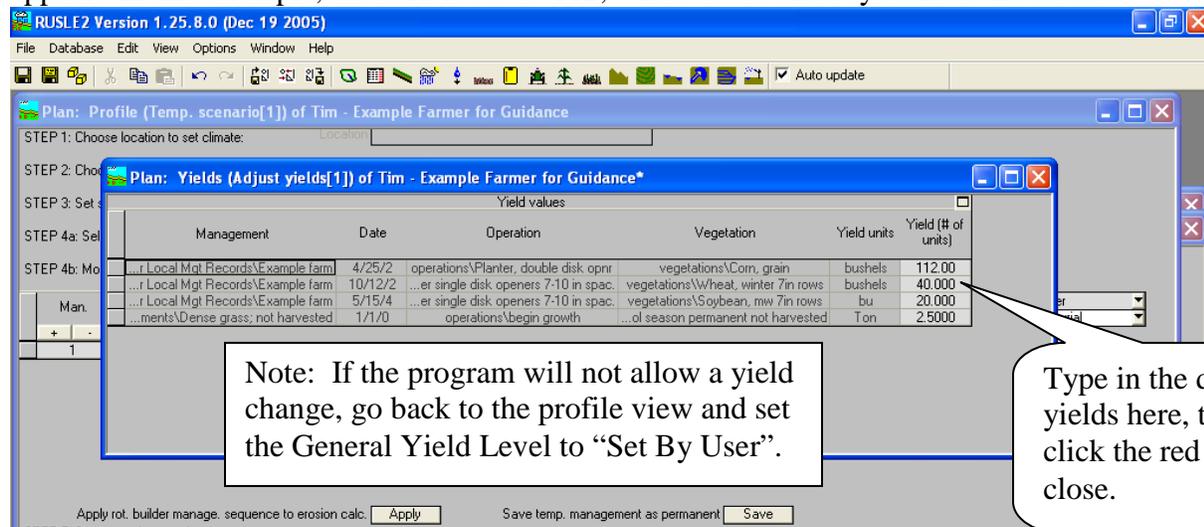
**Step 12: Complete Step 4c of profile view**

Step 4c allows the user to fine tune and make adjustments to crop yields based on adjustment or general yield level, adjust residual burial level and even account for percent rock cover. Click on any of the yellow folders to adjust/modify these items. Follow the guidelines below.



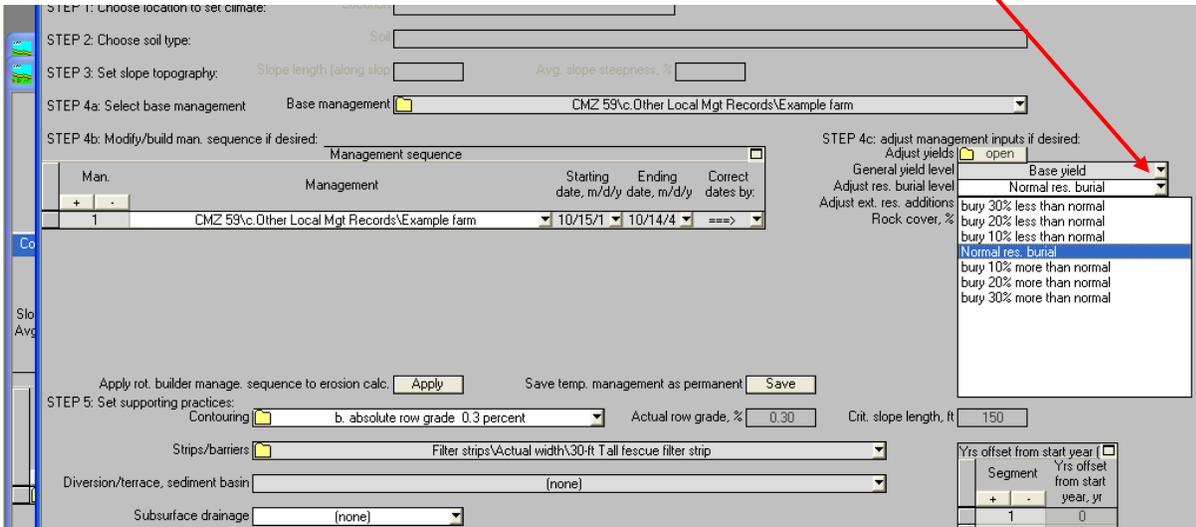
**Adjust Yields**

Click the yellow folder next to “Adjust yields”. The dialogue box to adjust the crop yields will appear. In this example, the corn is set @ 112, wheat @ 40 and soybeans @ 20 bu/ac.



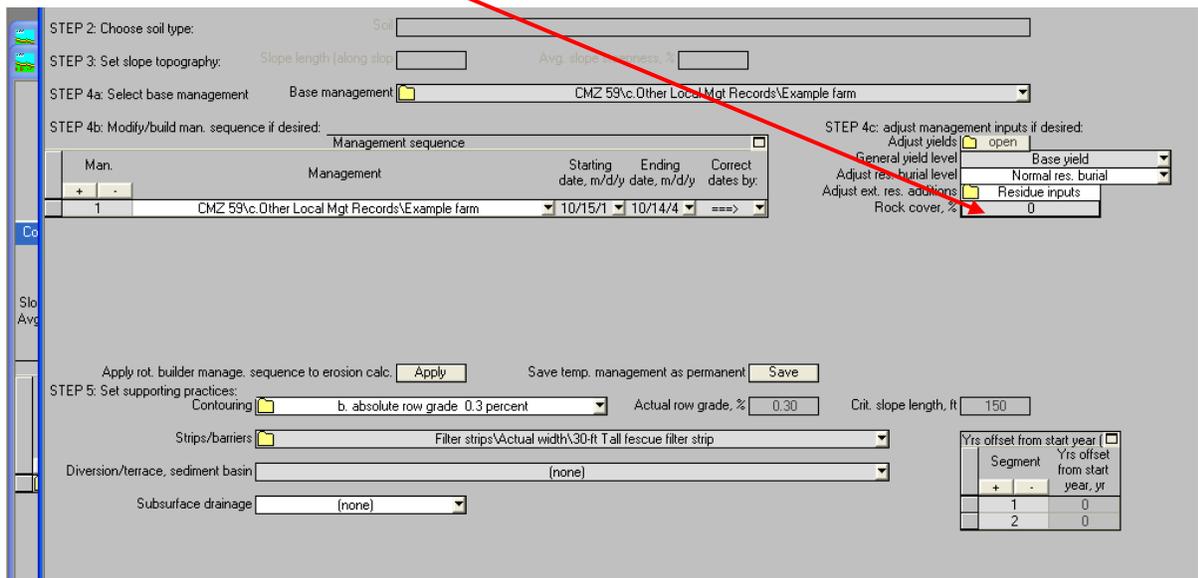
## Adjust Residue Burial

Click the drop down menu to open a choice list to decrease burial or increase burial rate for each field operation. Use these choices to better match the residue burial percentages for the site specific situations. Note: The selection effects ALL operations in the rotation.



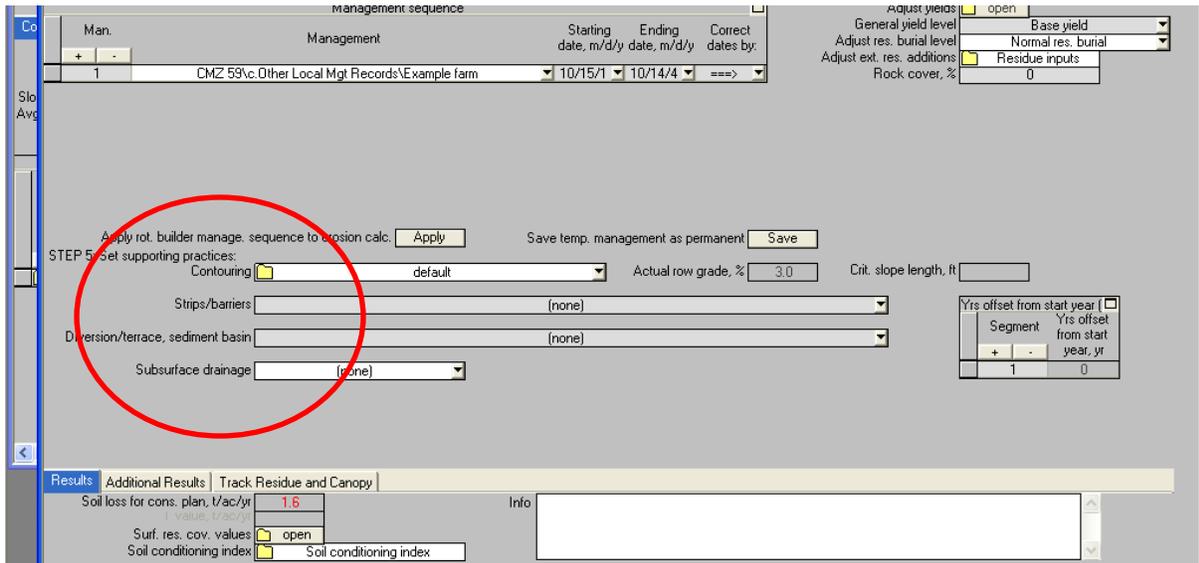
## Adjust Rock Cover

Click here to add the percent of the surface that meets the rock cover criteria (see the section “Rock Cover - Guidelines for Estimating Rock Cover in the Field”).



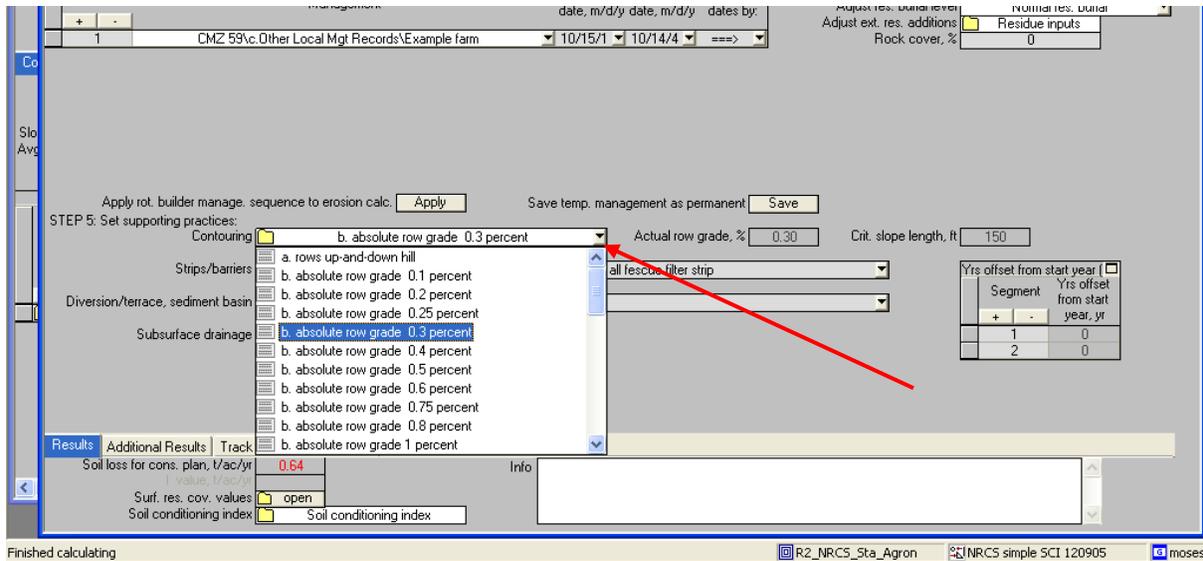
**Step 13: Complete step 5 of profile view**

Step 5 allows the user to enter any supporting practices that may be installed to reduce the overall soil loss and improve the Soil Conditioning Index (SCI) rating. Supporting practices such as Contouring, Strips/Barriers, Diversion/terrace, Sediment basins can all be selected by clicking on the drop down menus to the right for each.



**Contouring**

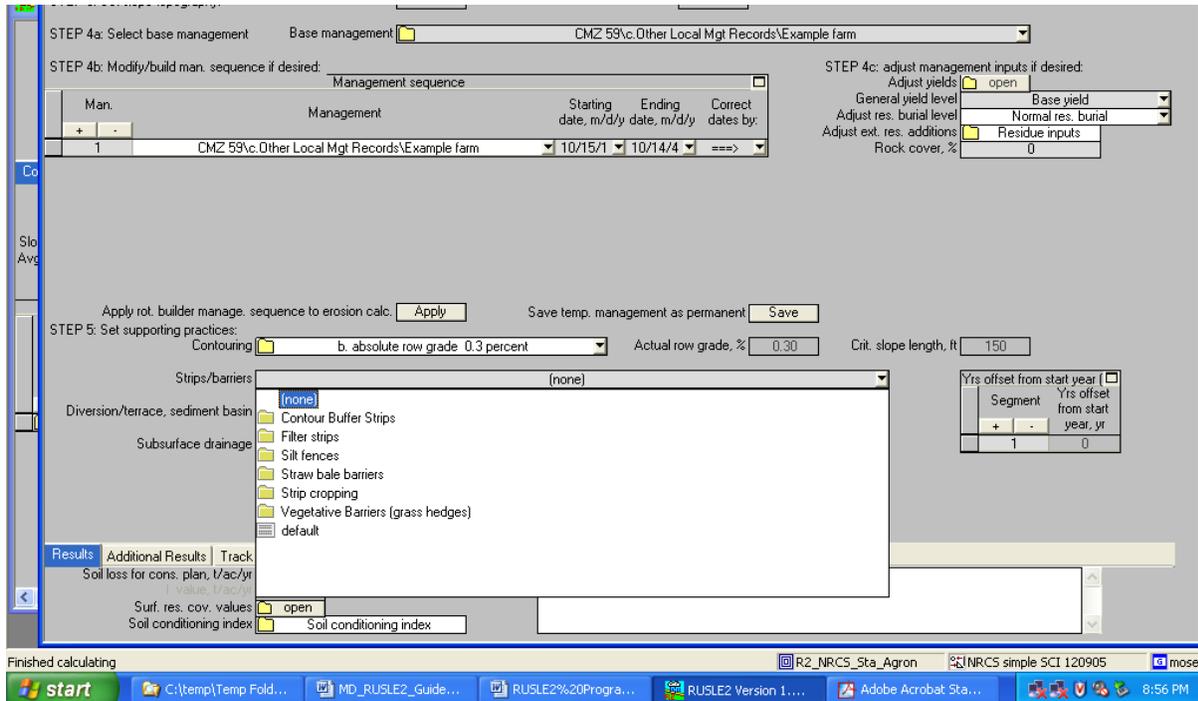
If contouring will be applied enter the appropriate choice using the “contouring” drop down menu.



Use only the absolute row grades. The row grade means the percent of grade off the contour; e.g. Absolute row grade of 1% means the contouring is actually on a 1% grade across the slope –

not on a perfect contour. There is one choice for “On Contour”. If contouring is not used, then use the default “up-and-down the hill”.

## Strips/Barriers



### Guidance to 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 1<sup>st</sup> and 2<sup>nd</sup> crop in the rotation are next to each other (this would be a two year rotation).

In a 0-2 means the 1<sup>st</sup> and 3<sup>rd</sup> 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 1<sup>st</sup> year and hay are adjacent or wheat and 2<sup>nd</sup> year hay are adjacent to each other).

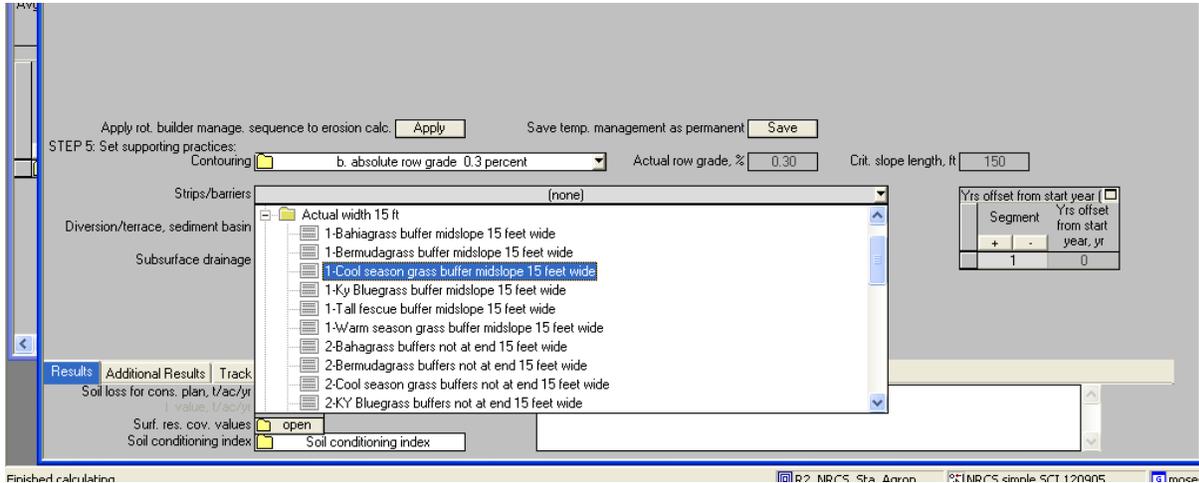
### Guidance to select Filter Strips

(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.

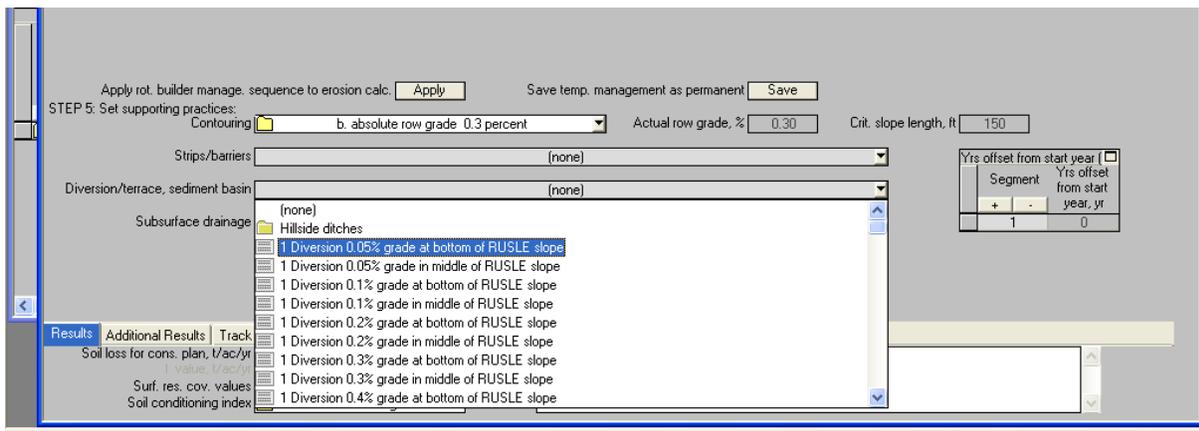
### Guidance to select Contour Buffer Strips

- 1<sup>st</sup> Select the actual width of the buffer
- 2<sup>nd</sup> Select the number of strips in “L”
- 3<sup>rd</sup> Select the type of cover



### Guidance to select Diversion/terrace, sediment basin

The input for the terrace object is the number of terraces on the hillslope, the grade of the terrace channel, and whether or not the last terrace is at the bottom of the hillslope.



### Guidance to select Subsurface Drainage

**Note: This function currently does not work in RUSLE2.**

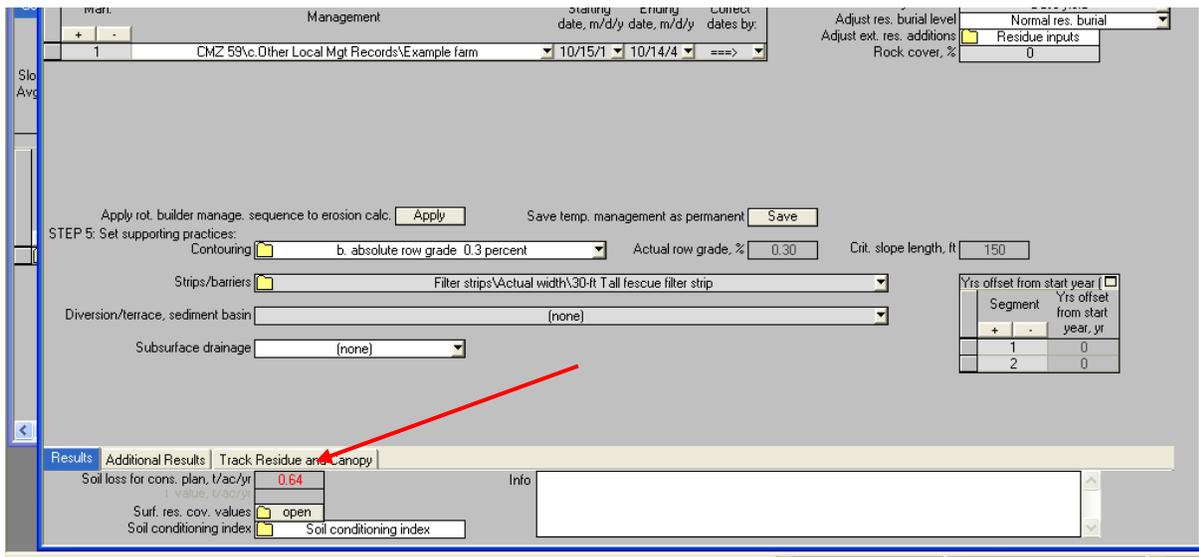
**This completes all data entry for calculating soil loss in RUSLE2. Next, review the results of RUSLE2 by reviewing the information below.**

## 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. RUSLE2 will also have the ability to estimate the amount of fuel used in the crop rotation. Note the screens below where this information can be found.

### 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.



### Soil Conditioning Index (SCI)

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 screenshot shows the RUSLE2 software interface. A dialog box titled "Plan: Soil conditioning index (Soil conditioning index[...]" is open, displaying the following values:

- Wind & irrigation-induced: 0
- SCI OM subfactor: 0.18
- SCI FD subfactor: 0.53
- SCI ER subfactor: 0.66
- Avg. annual slope STIR: 47.2
- Soil conditioning index (SCI): 0.4

Below these values is a table titled "Annual STIR Values by Crop Year":

| Start date, m/d/y | End date, m/d/y | Veg.                               | STIR value |
|-------------------|-----------------|------------------------------------|------------|
| 10/14/4           | 10/5/2          | vegetations\Corn, grain            | 100        |
| 10/5/2            | 7/15/3          | vegetations\Wheat, winter 7in rows | 74.1       |
| 7/15/3            | 10/14/4         | vegetations\Soybean, mw 7in rows   | 2.59       |

In the main software window, the "Results" section shows the "Soil conditioning index" folder highlighted in yellow. The "Soil loss for cons. plan, t/ac/yr" is 0.64, and the "Soil conditioning index" is 0.4.

### Average Annual Soil Tillage Intensity Rating (STIR)

Click the **yellow folder** next to Soil Conditioning Index

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.

The screenshot shows the RUSLE2 software interface with a dialog box titled "Plan: Soil conditioning index (Soil conditioning index...)".

**Soil Conditioning Index (SCI) Calculation:**

- Wind & irrigation-induced: 0
- SCI OM subfactor: 0.18
- SCI FD subfactor: 0.53
- SCI ER subfactor: 0.66
- Avg. annual slope STIR: 47.2
- Soil conditioning index (SCI): 0.4

**Annual STIR Values by Crop Year:**

| Start date, m/d/y | End date, m/d/y | Veg.                               | STIR value |
|-------------------|-----------------|------------------------------------|------------|
| 10/14/4           | 10/5/2          | vegetations\Corn, grain            | 100        |
| 10/5/2            | 7/15/3          | vegetations\Wheat, winter 7in rows | 74.1       |
| 7/15/3            | 10/14/4         | vegetations\Soybean, mw 7in rows   | 2.59       |

The main interface shows various input fields for location, soil, slope, and management practices. The "Soil conditioning index" is highlighted in the "Results" section at the bottom.

### Track Residue and Canopy

Click the “Track Residue and Canopy” tab to display Standing Mass, Surface Residue, Net Surface Cover, Net Canopy Cover and Live Biomass. Results are displayed for all crops in rotation based on crop growth days.

The screenshot shows the RUSLE2 software interface. The main window title is "RUSLE2 Version 1.25.8.0 (Dec 19 2005)". The menu bar includes File, Database, Edit, View, Options, Window, and Help. The toolbar contains various icons for file operations and simulation control. The main area is titled "Plan: Profile (Temp. scenario[1]) of Tim - Example Farmer for Guidance\*". It includes a dropdown menu for "CMZ 59% Other Local Mgt Records\Example farm" and date pickers for "10/15/1" and "10/14/4". There are buttons for "Apply", "Save", and "Auto update".

Under "STEP 5: Set supporting practices:", there are settings for "Contouring" (b. absolute row grade 0.3 percent), "Actual row grade, %" (0.30), "Crit. slope length, ft" (150), "Strips/barriers" (Filter strips\Actual width\30-ft Tall fescue filter strip), "Diversion/terrace, sediment basin" (none), and "Subsurface drainage" (none). A small table for "Yrs offset from start year" is also visible.

The "Track Residue and Canopy" tab is selected, showing a table with the following data:

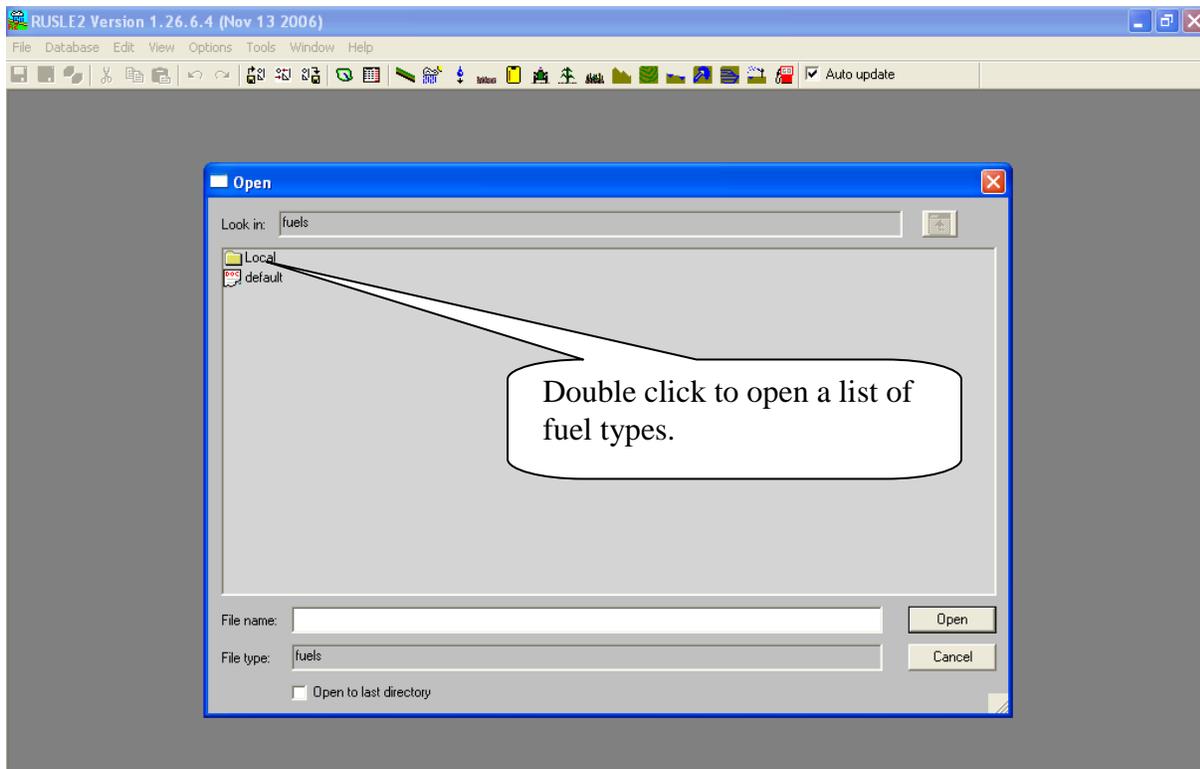
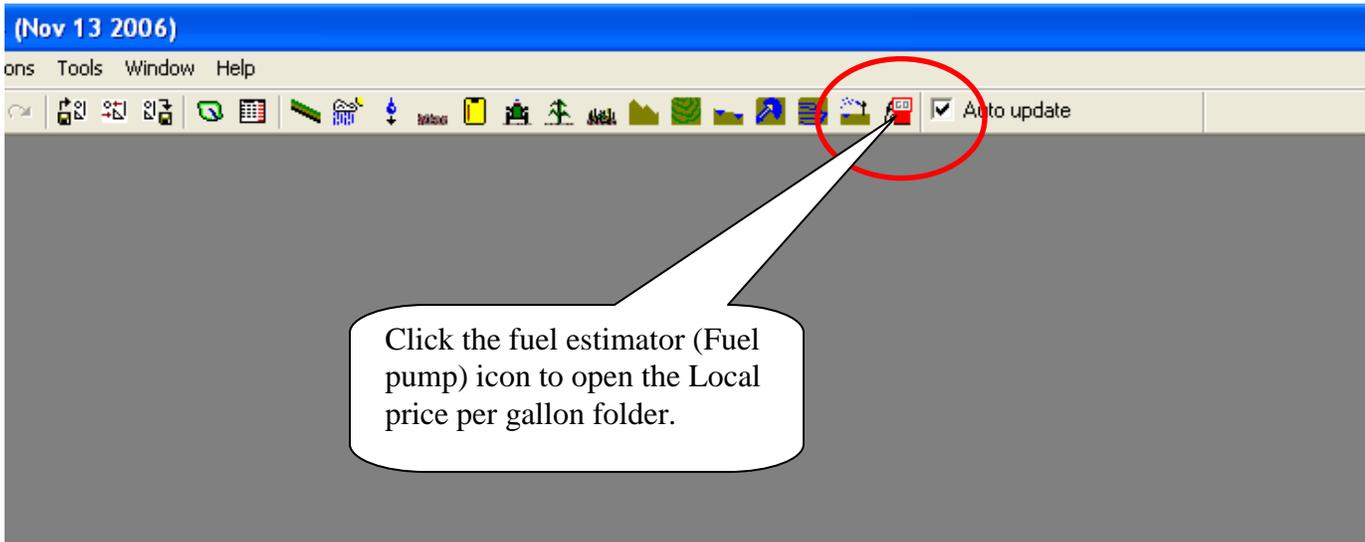
| SR (DAY_IN_SIM, SEGMENT) |                          |                      |                    |                     |                     |
|--------------------------|--------------------------|----------------------|--------------------|---------------------|---------------------|
| Simulation day, m/d/y    | Standing mass sum, lb/ac | Surf. residue, lb/ac | Net surf. cover, % | Net canopy cover, % | Live biomass, lb/ac |
| 10/15/1                  | 0                        | 930                  | 41                 | 56                  | 3800                |
| 10/16/1                  | 0                        | 940                  | 41                 | 56                  | 3800                |
| 10/17/1                  | 0                        | 950                  | 41                 | 55                  | 3800                |
| 10/18/1                  | 0                        | 960                  | 41                 | 55                  | 3700                |
| 10/19/1                  | 0                        | 970                  | 42                 | 55                  | 3700                |
| 10/20/1                  | 0                        | 980                  | 42                 | 54                  | 3700                |
| 10/21/1                  | 0                        | 990                  | 42                 | 54                  | 3700                |
| 10/22/1                  | 0                        | 1000                 | 43                 | 54                  | 3700                |
| 10/23/1                  | 0                        | 1000                 | 43                 | 53                  | 3700                |
| 10/24/1                  | 0                        | 1000                 | 43                 | 53                  | 3600                |

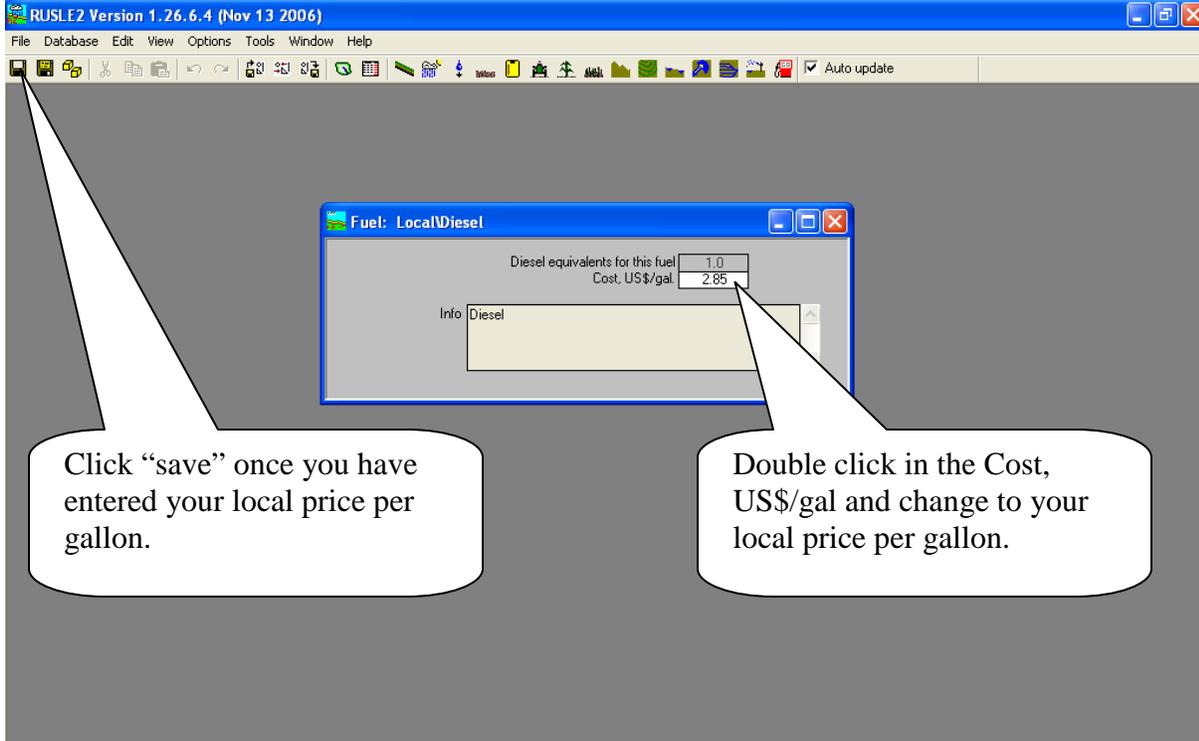
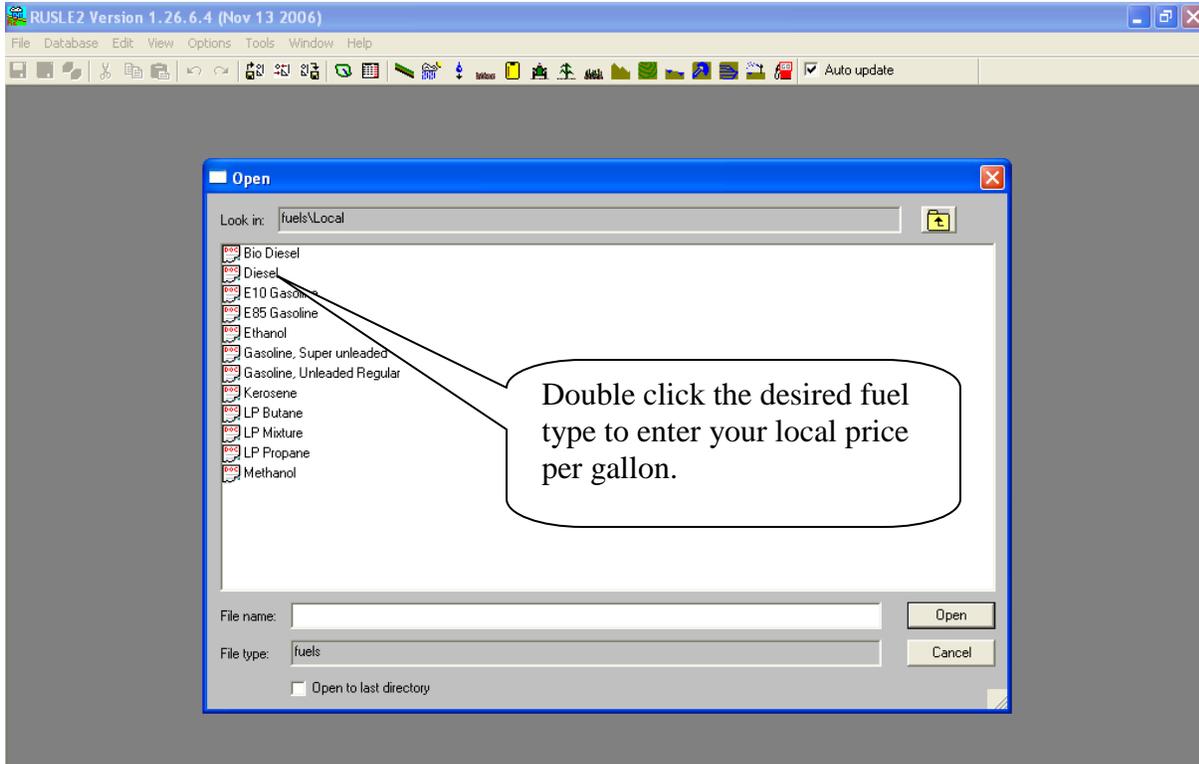
The taskbar at the bottom shows the system is "Finished calculating" and includes icons for "start", "C:\temp\Temp Fold...", "MD\_RUSLE2\_Guide...", "RUSLE2%20Progra...", "RUSLE2 Version 1....", "Adobe Acrobat Sta...", and the system clock at 8:32 PM.

### Fuel Estimator

RUSLE2 has the ability to calculate the amount of fuel used in the crop rotation. Each fuel type along with local cost per gallon can be entered into RUSLE2. Follow each step below to determine the cost per acre for fuel used in the operation.

#### Step 1 – Update fuel cost (price per gallon) for local area

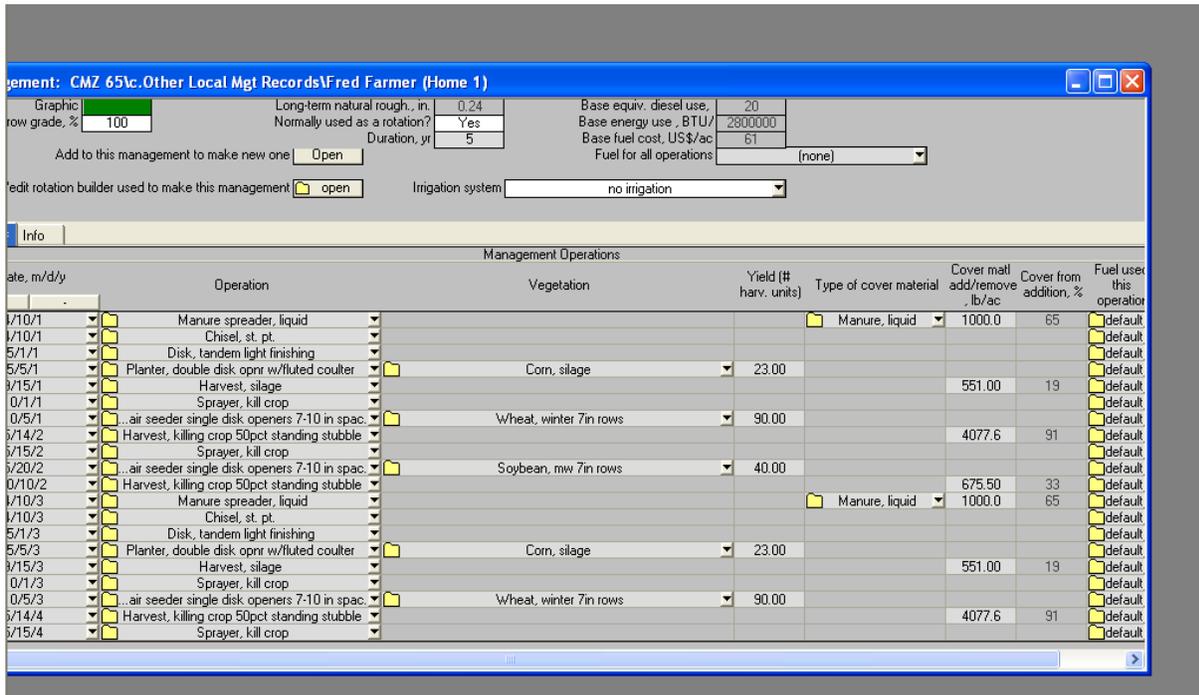




Don't forget to click "save" before you exit! You will need to perform the above steps for each fuel type price you change.

## Step 2 – Apply type of fuel used in Management (Rotation Build)

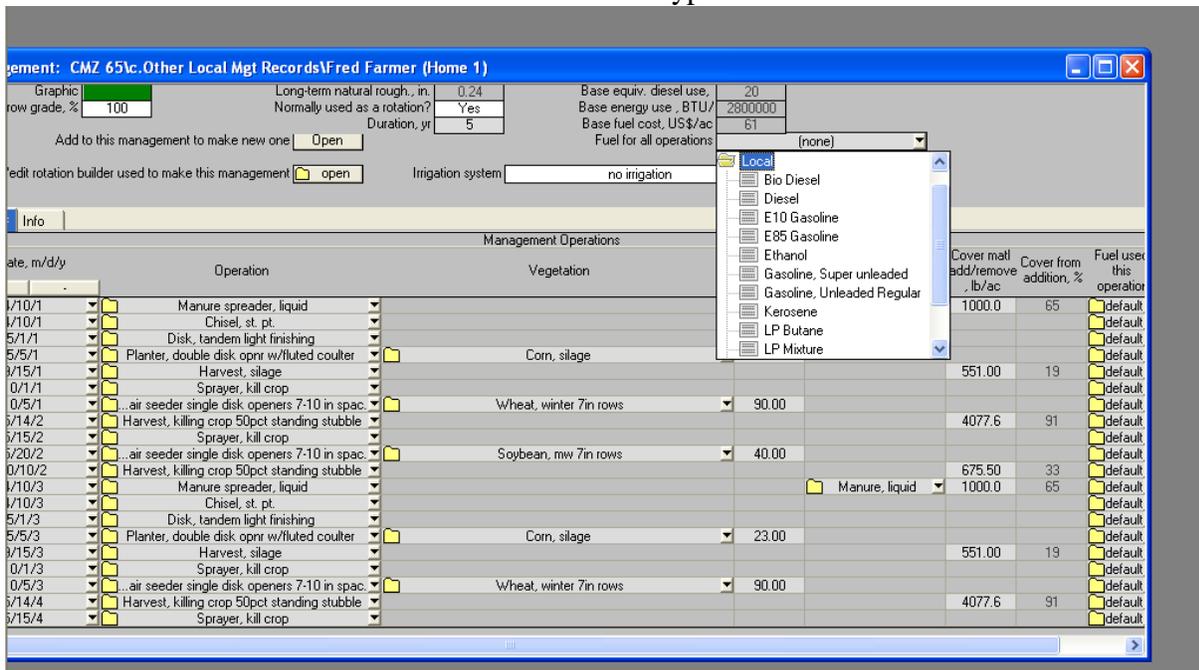
Open the desired disk management in mac folder or build a crop rotation for the producer.



Once you have the management folder open, you have two options to enter fuel use. You can enter fuel use for all operations, or fuel use for each operation.

### Option 1

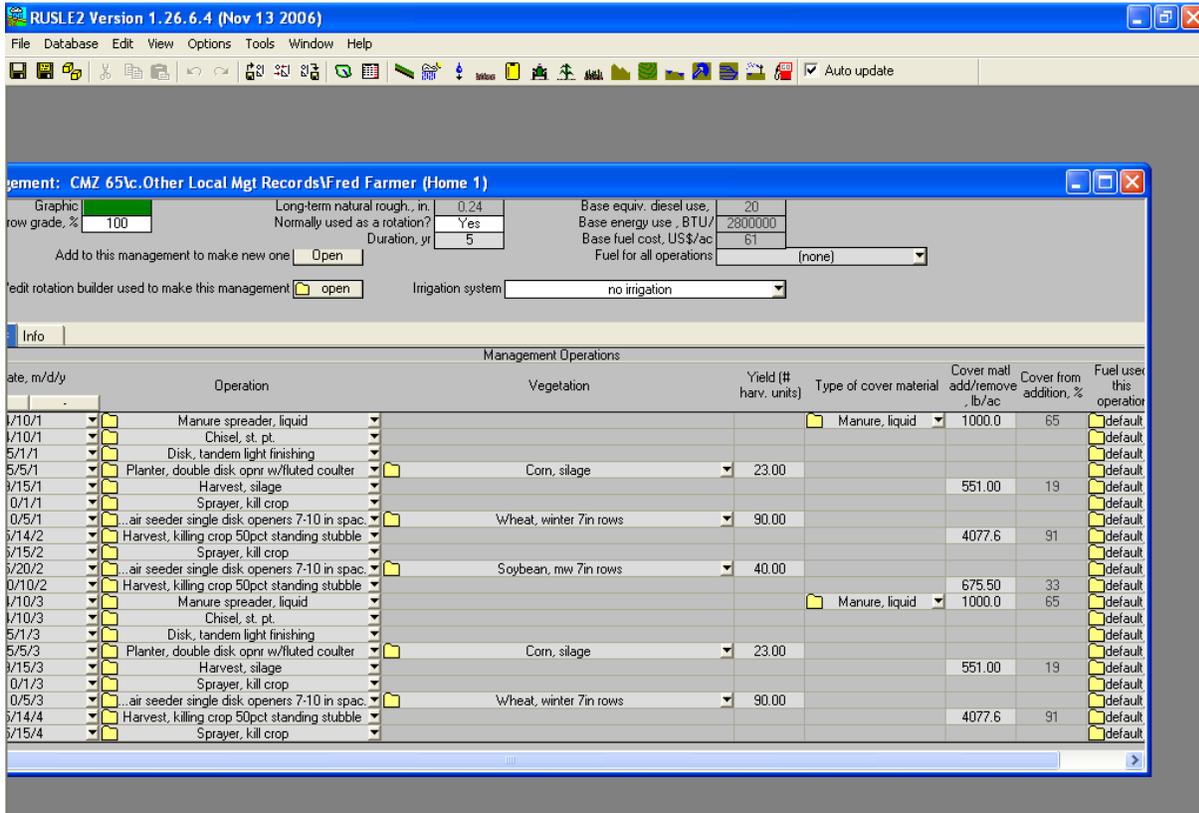
If the producer uses a certain fuel (example: diesel) for the entire operation, simply click the drop down menu shown below and double click the fuel type “diesel”.



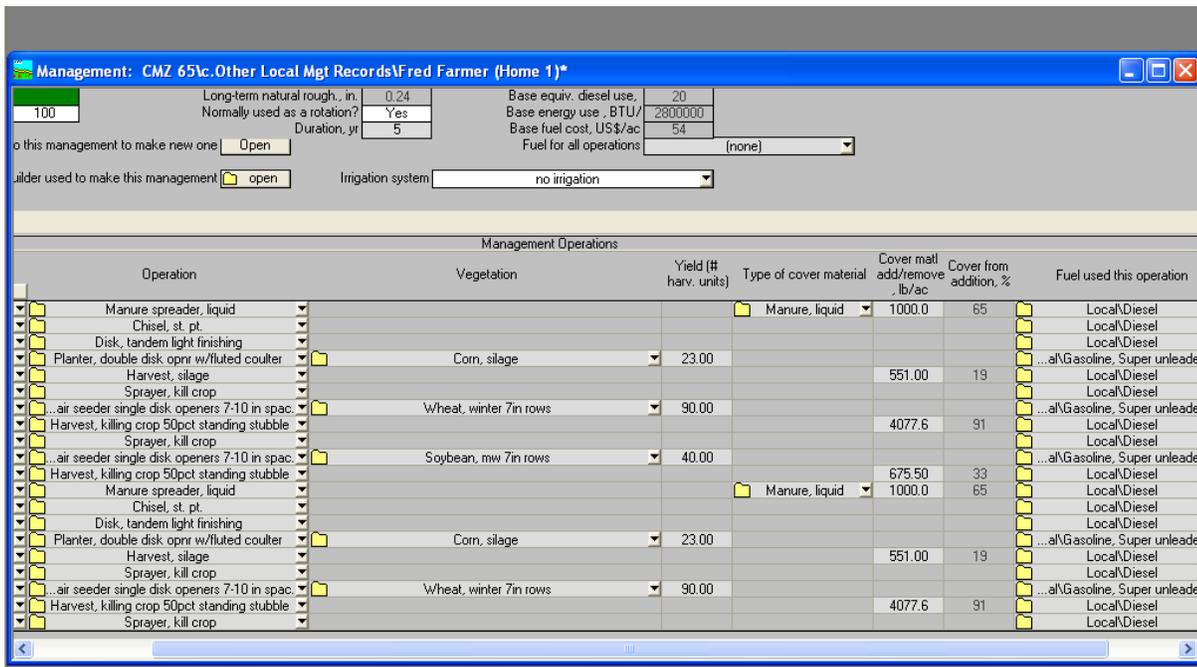
### Option 2

If the different types of fuel for the operation (example: diesel tractor for tillage and a gas tractor for planting), you will need to enter each fuel type in the Fuel Use in this Operation column.

Hint: Since the majority of the operation is tillage, enter the tillage fuel type in the Fuel for All Operations first. Then simply go back and enter in the other fuel type under the Fuel Used in this Operation column. This will save you a lot of time.



Your management folder should look something like below: Note for this example, the producer performs tillage with a diesel tractor and plants with a gas tractor.



### Step 3 – View the fuel per acre use results in Plan, Worksheet and/or profile view

Once you have entered the type of fuel that will be used in the management folder and you have applied that management folder to your RUSLE2 calculation, you can view the Fuel Cost/Acre in either the Plan View, Worksheet View or Profile View.

#### Plan View

| Field name | Description  | Cons. plan, soil loss, | Sed. delivery, | Fuel cost, US\$/ac |
|------------|--|------------------------|----------------|--------------------|
| 1          | Corn grain, fall chisel, twisted shank; Winter wheat, fall disk; Soybeans, narrow row, no-till                               | 6.7                    | 6.7            | 23.5               |
| 1          | ...rain, fall chisel, twisted shank; Winter wheat, fall disk; Soybeans, narrow row, no-till; filter strip, cool season grass | 4.3                    | 0.69           | 20.0               |
| 1          | Corn grain, no-till; Winter wheat, no-till; Soybeans, Narrow row, no-till, filter strip, cool season grass                   | 0.57                   | 0.32           | 13.4               |

#### Worksheet View (Note: this view will display each fuel cost for each scenario)

| Rock cover, % | Cons. plan, soil loss, t/ac/yr | Sed. delivery, t/ac/yr | Cover values | Soil conditioning index (SCI) | Wind & irrigation-induced erosion for SCI, t/ac/yr | Soil conditioning index (SCI) | STIR value | Description                                | Fuel type | Equiv. diesel use, gal/ac | Energy use, BTU/ac | Fuel cost, US\$/ac | Show in summary |
|---------------|--------------------------------|------------------------|--------------|-------------------------------|--|-------------------------------|------------|--|-----------|---------------------------|--------------------|--------------------|-----------------|
| 0             | 6.7                            | 6.7                    | ... cover    | ... conditioning index        | 0  | -0.18                         | 63.3       | ...isk; Soybeans, narrow row, no-till      | (none)    | 7.8                       | 1100000            | 23.54              | Yes             |
| 0             | 4.3                            | 0.69                   | ... cover    | ... conditioning index        | 0  | 0.060                         | 53.7       | ...o-till; filter strip, cool season grass | (none)    | 6.7                       | 920000             | 19.99              | Yes             |
| 0             | 0.57                           | 0.32                   | ... cover    | ... conditioning index        | 0  | 0.76                          | 3.30       | ...o-till, filter strip, cool season grass | (none)    | 4.5                       | 600000             | 13.37              | Yes             |

## Profile View

RUSLE2 Version 1.26.6.4 (Nov 13 2006)

File Database Edit View Options Tools Window Help

Plan: Profile (Temp. scenario[1]) of P-Index\Index Farmer

STEP 1: Choose location to set climate: Location: \_\_\_\_\_

STEP 2: Choose soil type: Soil: \_\_\_\_\_

STEP 3: Set slope topography: Slope length (along slope): \_\_\_\_\_ Avg. slope steepness, %: \_\_\_\_\_

STEP 4a: Select base management: Base management: CMZ 59\c.Other Local Mgt Records\P-Index\cgtw; ww; fds; sb; nr; nt; Z59

STEP 4b: Modify/build man. sequence if desired:

| Man. | Management  | Starting date, m/d/y | Ending date, m/d/y | Correct dates by: |
|------|---|----------------------|--------------------|-------------------|
| 1    | CMZ 59\c.Other Local Mgt Records\P-Index\cgtw; ww; fds; sb; nr; nt; Z59 | 10/15/1              | 10/14/4            | ==>               |

STEP 4c: adjust management inputs if desired:

Adjust yields:  open

General yield level: Base yield

Adjust res. burial level: Normal res. burial

Adjust ext. res. additions:  Residue inputs

Rock cover, %: 0

Fuel type for entire run: (none)

Equiv. diesel use for entire simulation, gal/ac: 7.8

Energy use for entire simulation, BTU/ac: 1100000

Fuel cost for entire simulation, US\$/a: 23.54

Net C factor: 0.13

Net LS: \_\_\_\_\_

Apply rot. builder manage. sequence to erosion calc.  Save temp. management as permanent

STEP 5: Set supporting practices:

Contouring:  b. absolute row grade 1 percent Actual row grade, %: 1.0 Crit. slope length, ft: 140

Strips/barriers: (none)

Diversion/terrace, sediment basin: (none)

Subsurface drainage: (none)

Yrs offset from start year

| Segment | Yrs offset from start year, yr |
|---------|--------------------------------|
| 1       | 0                              |

Results Additional Results Track Residue and Canopy

|                                   |                               |      |
|-----------------------------------|-------------------------------|------|
| Soil loss for cons. plan, t/ac/yr | 6.7                           | Info |
| 1 Value, t/ac/yr                  |                               |      |
| Surf. res. cov. values            | <input type="checkbox"/> open |      |

## Other Notes/Guidelines for Using RUSLE2

You may adjust almost any of the values where there is a **yellow folder**. Just click on the **yellow folder** next to what you would like to adjust and you will drill down into data. You may not save changes to the CMZ templates, only to local folders.

In the WORKSHEET view, you may change cover values, yield, etc.

In the PROFILE view, you may adjust yields by clicking on the **yellow folder** next to “Adjust Yields”, or change yields by a percentage next to “General Yield Level”. Note: To adjust yields, make sure the “General Yield Level” is set to “Set by User”.

In the PROFILE view, you may also change implements for each base management by clicking on the **yellow folder** next to the management, then using drop down menus to change the equipment for each practice. You may also change dates in this screen.

**Soil Conditioning Index rating or SCI.** 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.

**Soil Tillage Intensity Rating or STIR.** 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 disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.

**Soil Loss for Conservation Planning (t/ac/yr):** This is the figure to use for conservation planning which measures the tolerable soil loss expressed as average annual soil loss in tons/acre/year.

**Sediment Delivery (t/ac/yr):** Soil loss on “L” minus what is deposited within the “L”.

### DELETING CREATED PROFILES, WORKSHEETS, AND PLAN VIEWS

On the menu toolbar, click Database, scroll down and click Rearrange. Click on the database choice you want to delete objects from, i.e., profiles, worksheets, or plans. Then go to the screen on the right, right click on the file you wish to delete, scroll down and left click on delete. Then confirm by clicking **Yes** and the file will be removed from the list.

You can also open up the file, go to the menu toolbar, click File and then scroll down to delete. RUSLE2 will ask you if you are sure you want to delete this file. Click “yes” to delete.



**Be certain that you want to delete before hitting the yes button. There is no way to retrieve a deleted file.**

## ROCK COVER - Guidelines for Estimating Rock Cover in the Field

**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.

**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 mean in Maryland soils is about 11 percent by volume.

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                                    |

|   |
|---|
| Guidelines for Estimating Soil Erosion with Ridges and Beds |
|---|

With Additional Notes on Sediment Delivery and Plastic Mulch

### **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 field.** So, the estimate of percent cover must include the furrow areas as well as the beds or ridges.

## GUIDELINES FOR MANURE ADDITION

**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.

When manure is placed directly into the soil by injection (knifing), the manure is placed in the lower one half of the depth of surface disturbance used to inject the manure. The concentration of the manure is zero at one half the depth, maximum at three quarters depth, and zero at the depth of the disturbance. Subsequent tillage operations can bring some of the manure to the soil surface depending on the nature of the subsequent tillage operations.

Manure can be added to the surface and later be incorporated with an operation like a tandem disk. Four types of animal manure have been identified and are grouped according to their relative rates of decay. A group having a fast decomposition rates includes poultry litter and municipal sewage; one having a moderate rate includes beef, swine and dairy lagoon wastes; one having a moderately slow rate includes beef, swine and dairy manure from open lots or buildings; and one having a slow decomposition rate includes straw and wood shavings.

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. Enter the manure operation in the operations section, then choose the type of manure under “External Residue”. Next, open the external residue choice (click yellow folder next to residue type) and choose the correct amount of residue applied. Amounts are listed by coverage vs. mass. See below.

### **How to incorporate manure into Crop Management File**

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.

The screenshot shows the 'Management Operations' window in RUSLE2. The window title is 'Management: CMZ 04c:Other Local Mgt Records\corn grain;fmanure high disturb, Phoenix harrow, Soybean;wr, NT z4\*'. The 'Operations' tab is selected, and the 'Info' sub-tab is active. The main area displays a table of operations with columns for Date, Operation, Vegetation, Yield (# harv. units), External residue, and Surf. res. add. / remo. A red arrow points to the 'External residue' column, which shows a yellow folder icon and the text 'Manure, liquid'.

| Date, m/d/y | Operation                                     | Vegetation             | Yield (# harv. units) | External residue | Surf. res. add. / remo. | Coverage |
|-------------|---|------------------------|-----------------------|------------------|-------------------------|----------|
| 11/15/1     | Manure injector, liquid high disturb. 30 inch |                        |                       | Manure, liquid   | 0                       |          |
| 5/10/2      | Harrow, heavy on heavy residue                |                        |                       |                  |                         |          |
| 5/10/2      | Planter, double disk oprn w/fluted coulters   | Corn, grain            | 112                   |                  |                         |          |
| 10/20/2     | Harvest, killing crop 50pct standing stubble  |                        |                       |                  | 5958.4                  | 90       |
| 5/15/3      | Planter, double disk oprn w/fluted coulters   | Soybean, mw 30 in rows | 30.0                  |                  |                         |          |
| 10/10/3     | Harvest, killing crop 50pct standing stubble  |                        |                       |                  | 1026.0                  | 45       |

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 Ag Waste Handbook for various manure classes.

There are some new RUSLE2 manure residue effectiveness guidelines for **liquid, slurry, semi-solid and poultry** manure types that only **50%** of the dry weight for these wet manure types should be used. Liquid, slurry, semi-solid, and poultry manure types are not as affective in retarding the erosion process as solid manures. RUSLE 2 users should enter only half of the dry weight computed for these manure types. Use 100 % of dry weight calculated for solid manure and solid manure plus bedding.

### **Equations to Convert to Pounds Dry Matter**

#### **(A) For liquids and slurries**

$(\text{gals /ac}) \times (8.34 \text{ lbs/gal}) \times (\% \text{ solids as a decimal}) = \text{lbs dry matter}$

Sample calculations:

$(10,000 \text{ gal /ac}) \times (8.34 \text{ lbs/gal}) \times (0.02) = 1668 \text{ lbs/ac dry matter}$

RUSLE2 Conversion:  $1668 \text{ lbs/ac dry matter} \times 0.5 = 834 \text{ lbs/ac}$

#### **(B) For semi-solids**

$(\text{lbs /ac}) \times (\% \text{ semi-solids as a decimal}) = \text{lbs dry matter}$

Sample calculations:

$(8000 \text{ lbs /ac}) \times (0.15) = 1200 \text{ lbs/ac dry matter}$

RUSLE2 Conversion:  $1200 \text{ lbs/ac dry matter} \times 0.5 = 600 \text{ lbs/ac}$

#### **(C) For solids**

$(\text{lbs /ac}) \times (\% \text{ solids or semi-solids as a decimal}) = \text{lbs dry matter}$

Sample calculation:

$(8000 \text{ lbs /ac}) \times (0.55) = 4400 \text{ lbs/ac dry matter}$

### **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

**Summary of % Moisture Content Manure**  
**Source: Agricultural Waste Management Field Handbook.**

| <b>Species</b>                     | <b>% Moisture Content</b> | <b>% Solid Content</b> |
|------------------------------------|---------------------------|------------------------|
| <b>Dairy</b>                       |                           |                        |
| Milk House                         | 99.7%                     | 0.3%                   |
| Milk House + Parlor                | 99.4%                     | 0.6%                   |
| Milk House + Parlor + Holding area | 99.7%                     | 0.3%                   |
| Anaerobic lagoon – Sludge          | 90.0%                     | 10.0%                  |
| Anaerobic lagoon – Supernatant     | 99.75%                    | 0.25%                  |
| Aerobic lagoon – Supernatant       | 99.95%                    | 0.05%                  |
| <b>Beef</b>                        |                           |                        |
| Unsurfaced lot                     | 45.0%                     | 55.0%                  |
| Surfaced lot - High forage         | 53.3%                     | 46.7%                  |
| Surfaced lot – High energy         | 52.1%                     | 47.9%                  |
| Feedlot runoff pond – Sludge       | 82.8%                     | 17.2%                  |
| Feedlot runoff pond – Supernatant  | 99.7%                     | 0.3%                   |
| <b>Swine</b>                       |                           |                        |
| Storage tank under slats           |                           |                        |
| Farrow                             | 96.5%                     | 3.5%                   |
| Nursery                            | 96.0%                     | 3.0%                   |
| Grow/Finish                        | 91.0%                     | 9.0%                   |
| Breeding/gestation                 | 97.0%                     | 3.0%                   |
| Anaerobic lagoon – Supernatant     | 99.75%                    | 0.25%                  |
| Anaerobic lagoon – Sludge          | 92.4%                     | 7.6%                   |
| Feedlot runoff water               | 98.5%                     | 1.5%                   |
| Feedlot settling basin sludge      | 88.8%                     | 11.2%                  |
| <b>Poultry</b>                     |                           |                        |
| Litter                             |                           |                        |
| Layer high-rise                    | 50.0%                     | 50.0%                  |
| Broiler                            | 24.0%                     | 76%                    |
| Turkey                             | 34.0%                     | 66%                    |
| Broiler breeder                    | 34.0%                     | 66%                    |
| Anaerobic lagoon                   |                           |                        |
| Layer – Supernatant                | 99.5%                     | 0.5%                   |
| Layer – Sludge                     | 86.9%                     | 13.1%                  |
| Veal As Excreted                   | 97.5%                     | 2.5%                   |
| Sheep As Excreted                  | 75.0%                     | 25%                    |
| Horse As Excreted                  | 78.0%                     | 22%                    |

## GUIDELINES FOR 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 Management Screen. 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.

Management: CMZ 65\c.Other Local Mgt Records\Fred Farmer (spring manure)\*

Graphic:  Long-term natural rough, in. 0.24  
 Rel. row grade, % 100 Normally used as a rotation? Yes  
 Duration, yr 2

Add to this management to make new one

View/edit rotation builder used to make this management  Irrigation system

First, click the drop down menu and choose the correct method of application

Next, click the yellow folder. Enter the date of application along with amount (in inches) of water applied. Note: click the + (plus) sign for additional dates

| Date   | Operation                                | Rate                               | Amount |
|--------|--|------------------------------------|--------|
| 4/10   |  |                                    |        |
| 4/10   |  |                                    |        |
| 5/1    |  |                                    |        |
| 5/5/1  | ... double disk open windrow cooler      | vegetations\Corn, silage           |        |
| 9/15/1 | operations\Harvest, silage               |                                    |        |
| 10/1/1 | operations\Sprayer, kill crop            |                                    |        |
| 10/5/1 | ... er single disk openers 7-10 in spac. | vegetations\Wheat, winter 7in rows |        |
| 5/14/2 | ... killing crop 50pct standing stubble  |                                    |        |
| 5/15/2 | operations\Sprayer, kill crop            |                                    |        |

Apply Apply/Close Cancel

### Enter irrigation application by Depth

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

Management: CMZ 65vc.Other Local Mgt Records\Fred Farmer (spring manure)\*

Graphic  Long-term natural rough., in. 0.24  
 Rel. row grade, % 100 Normally used as a rotation? Yes  
 Duration, yr 2

Add to this management to make new one

View/edit rotation builder used to make this management  Irrigation system

Operations Info

Vegetation

| Date   | Operation  |
|--------|--|
| 4/10/1 | operations\Chisel, st. pt.                                       |
| 5/1/1  | ...rations\Disk, tandem light finishing                          |
| 5/5/1  | ...r, double disk opnr w/fluted coulters                         |
| 9/15/1 | operations\Harvest, silage                                       |
| 10/1/1 | operations\Sprayer, kill crop                                    |
| 10/5/1 | ...er single disk openers 7-10 in spac. ...heat, winter 7in rows |
| 5/14/2 | ... killing crop 50pct standing stubble                          |
| 5/15/2 | operations\Sprayer, kill crop                                    |

Irrig. depths by Date period starts/ends m/d/yr

|        |
|--------|
| 6/10/1 |
| 6/24/1 |
| 6/25/1 |
| 7/5/1  |

Apply Apply/Close Cancel

### 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.

Management: CMZ 65vc.Other Local Mgt Records\Fred Farmer (spring manure)\*

Graphic  Long-term natural rough., in. 0.24  
 Rel. row grade, % 100 Normally used as a rotation? Yes  
 Duration, yr 2

Add to this management to make new one

View/edit rotation builder used to make this management  Irrigation system

Management Operations

Vegetation

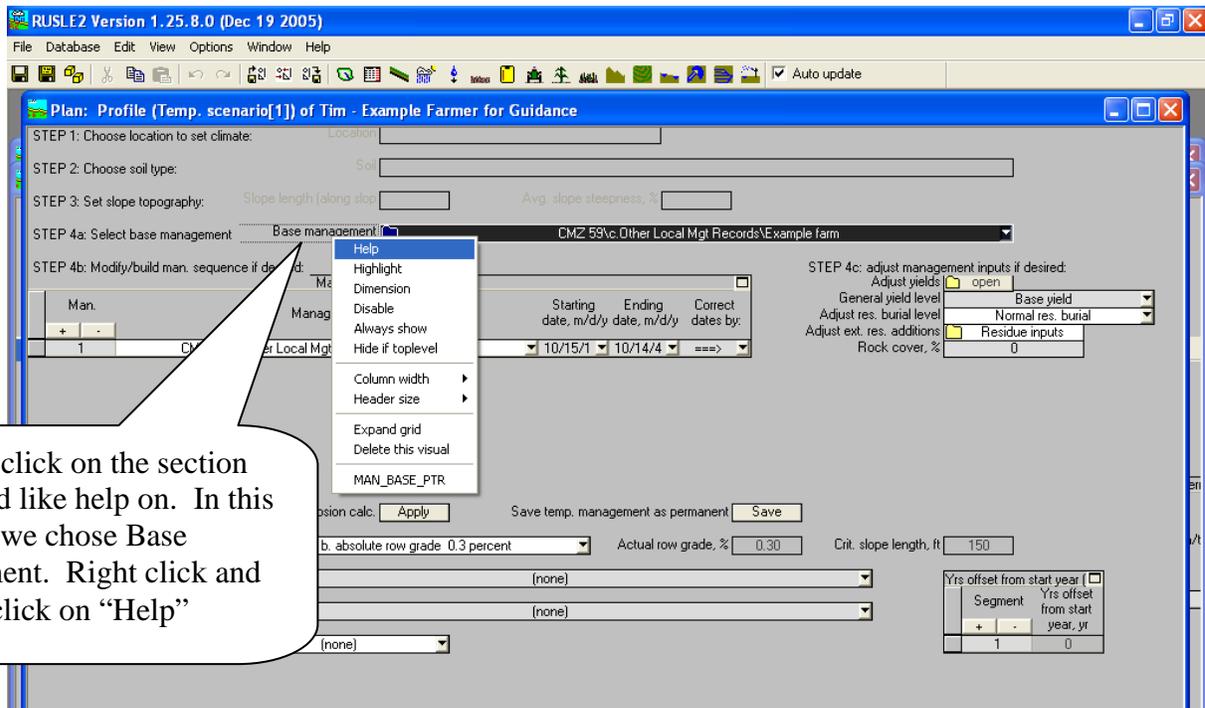
| Year | Veg/s. during month            | Day of change/s | Net irrig. depth, in. |
|------|--------------------------------|-----------------|-----------------------|
| 4/1  | None                           |                 | 0                     |
| 5/1  | None => Corn, silage           | 5               | 0                     |
| 6/1  | Corn, silage                   |                 | 2.0                   |
| 7/1  | Corn, silage                   |                 | 4.0                   |
| 8/1  | Corn, silage                   |                 | 3.0                   |
| 9/1  | Corn, silage => None           | 15              | 0                     |
| 10/1 | None => Wheat, winter 7in rows | 5               | 0                     |
| 11/1 | Wheat, winter 7in rows         |                 | 0                     |
| 12/1 | Wheat, winter 7in rows         |                 | 0                     |

Apply Apply/Close Cancel

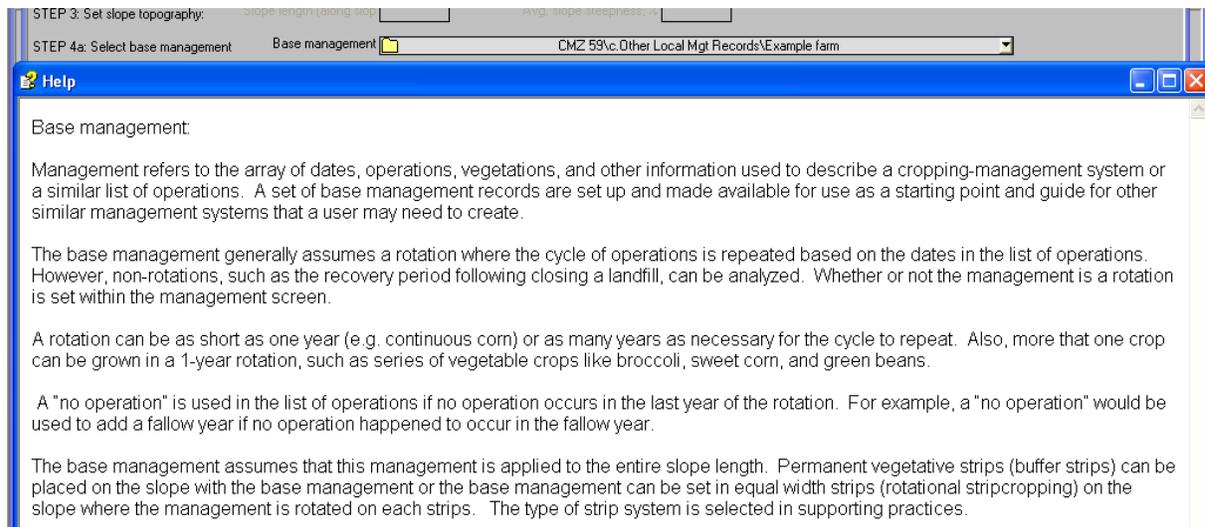
## HELP SCREENS

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. Note: Help screens are currently NOT available for several areas of RUSLE2. These are in process of being developed and will come available in future versions. Help screens that are available can be viewed in any screen. To access a help screen follow the steps below.

For this example, the Profile View is used  
Base Management Help



The following help screen will appear.

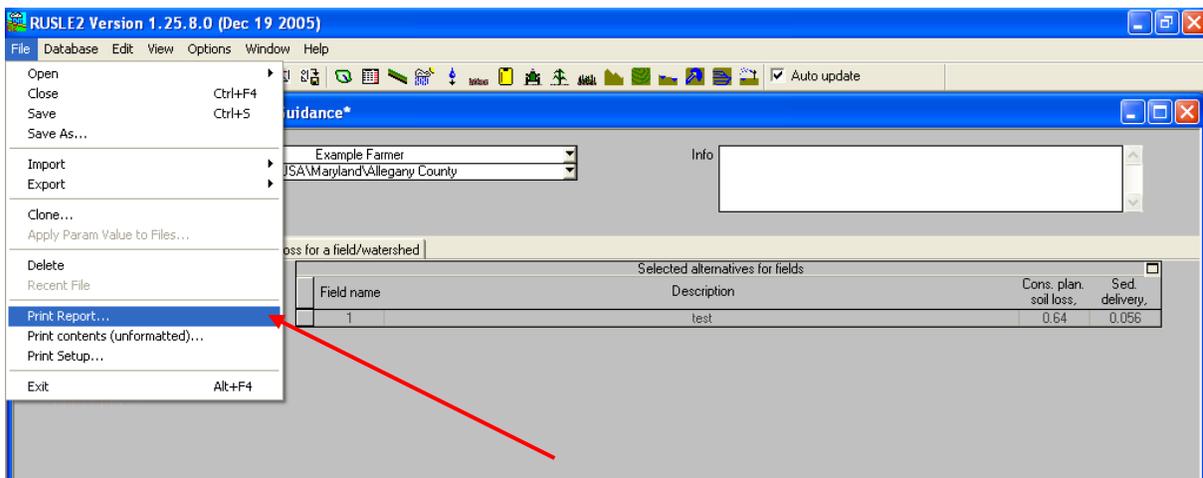


## PRINTING AND SAVING REPORTS

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. For NRCS users, it is suggested you save the file in the client's customer folder within the Toolkit directory.

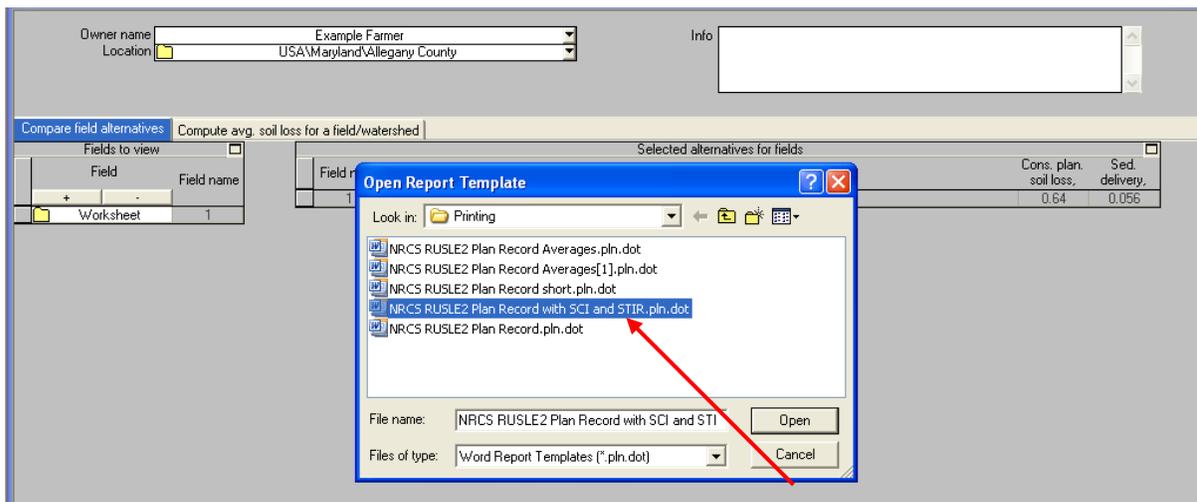
**Note:** The instructions below can be used for either the WORKSHEET, PLAN, or PROFILE view.

**Step 1:** Click on File on the menu toolbar. Select **Print Report**.

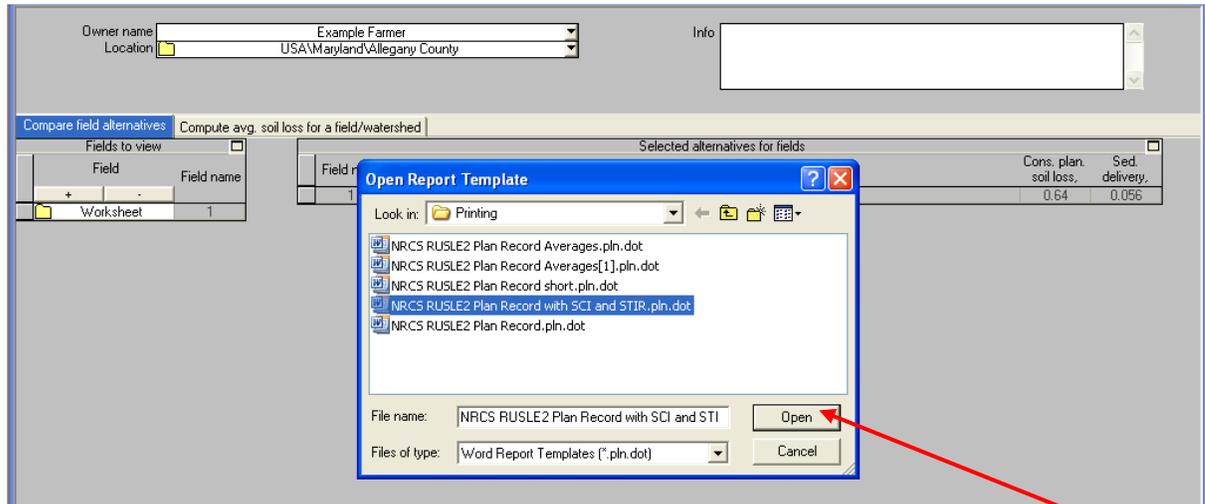


**Step2:** After the dialogue box appears, select the appropriate template. See Appendix 1 for examples of each printout. Note: The PROFILE Record Expanded.dot version should rarely be used because it is a 3 page printout for a single year crop with entirely too much information for the average conservation plan.

Choose a print template that will display the SCI and STIR value. For example in Plan View, choose NRCS RUSLE2 Plan Record with SCI and STIR.



**Step 3:** Click open in the dialogue box. This will open MS Word and display your record of results.



**Step 4:** 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. If you list the proper path, this can be saved in the land user's file in Customer Service Toolkit.

## MANAGING FILES AND FOLDERS

There are several ways to manage your RUSLE2 files and folders. Whichever way you decide, you should consult with your field office staff to ensure all understand the management system. Since each field office shares the same "moses" database and have access to all files and folders in this database, care should be taken to ensure all users understand exactly how the RUSLE2 data is stored. This section does not provide you with a system of management for your files and folders, it has only been developed to aid the user on how to develop a management system.

## Managing files and folders in RUSLE2

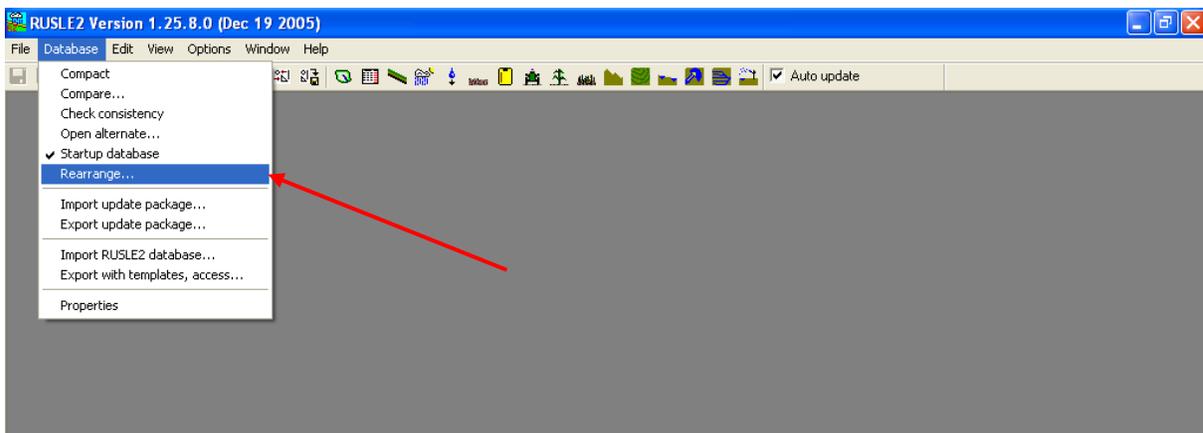
### RUSLE2 Farm Information

Each view of RUSLE2 (Profile, Worksheet and Plan view) have a separate folder system for managing files. These sections are designed to only store your farm/field information for the farms you are working with. They DO NOT store your management folders or crop rotations you have developed. Although these are linked to your farm/field folders, they are saved in a separate location.

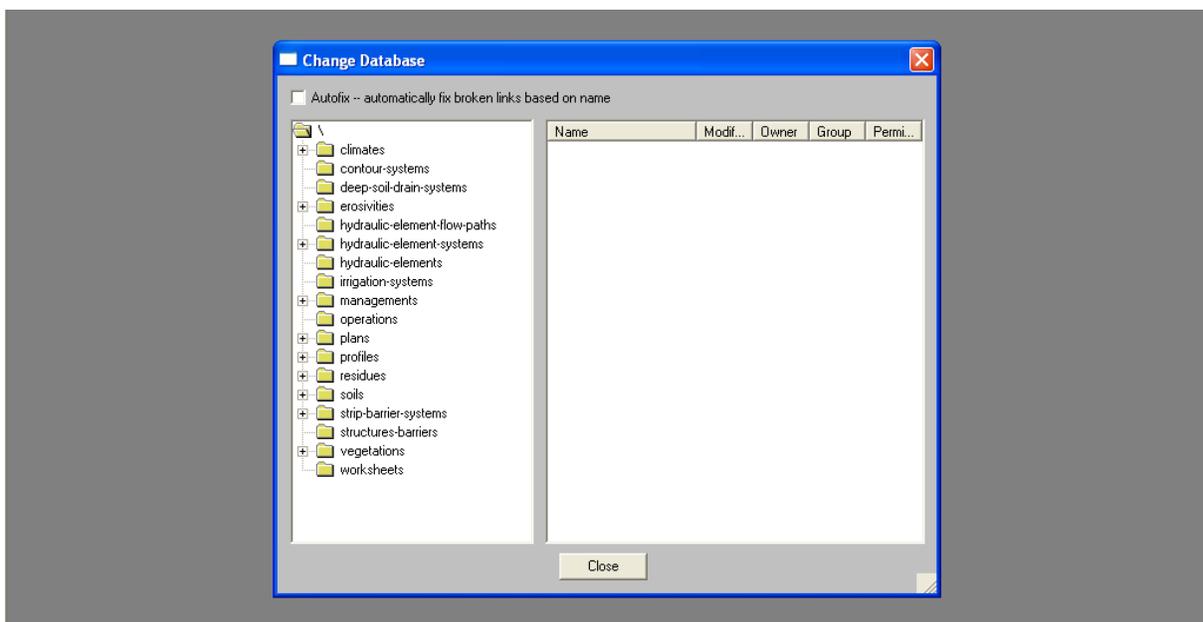
Note: All above information is saved or located in your “moses” database. This guidance is developed to inform you how these files are saved and how to manage the files.

### Saving files and folders in Profile, Worksheet or Plan view

**Step 1:** Open the Database/Rearrange folder. Do this by clicking on Database in your toolbar. Next click on “Rearrange”.

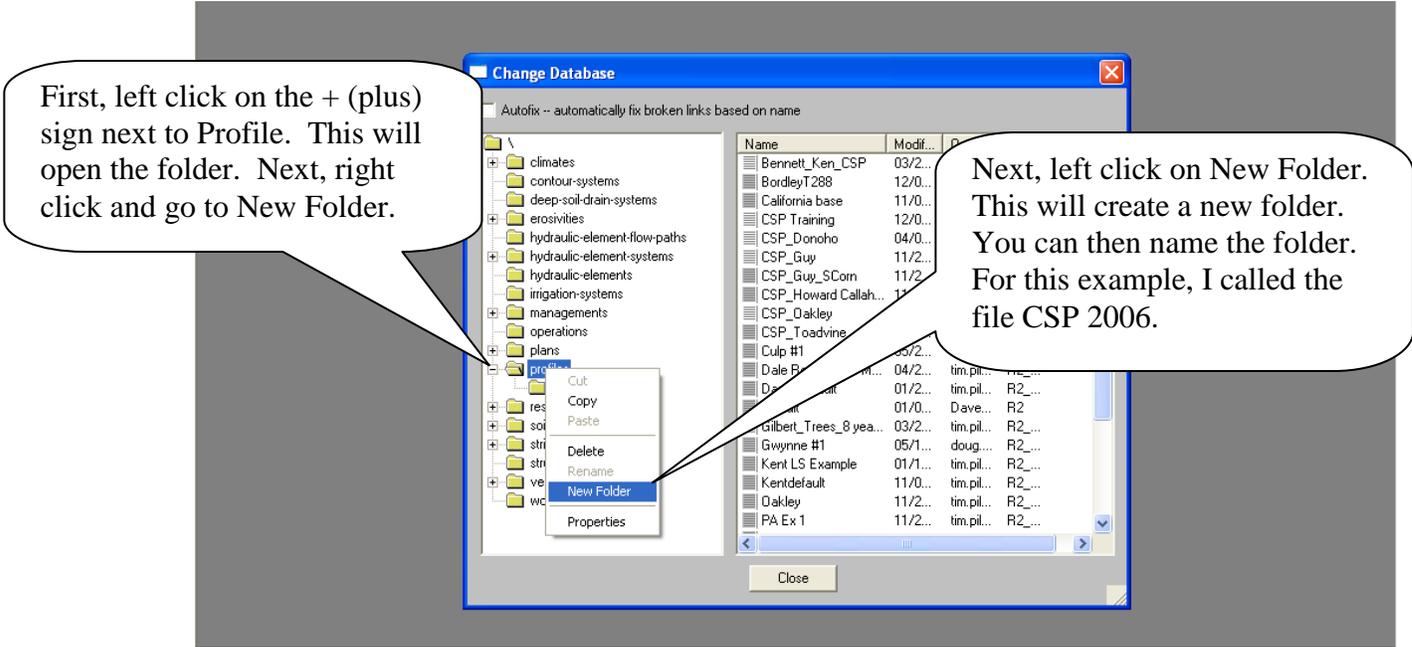


The following screen will appear.

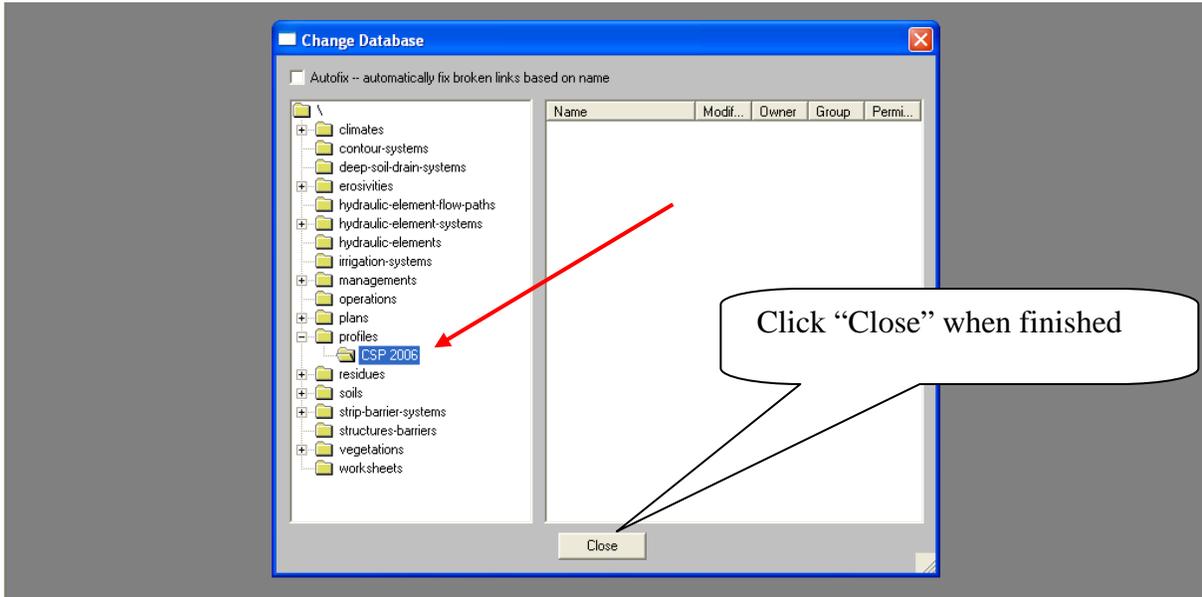


**Step 2:** Create your folders and subfolders

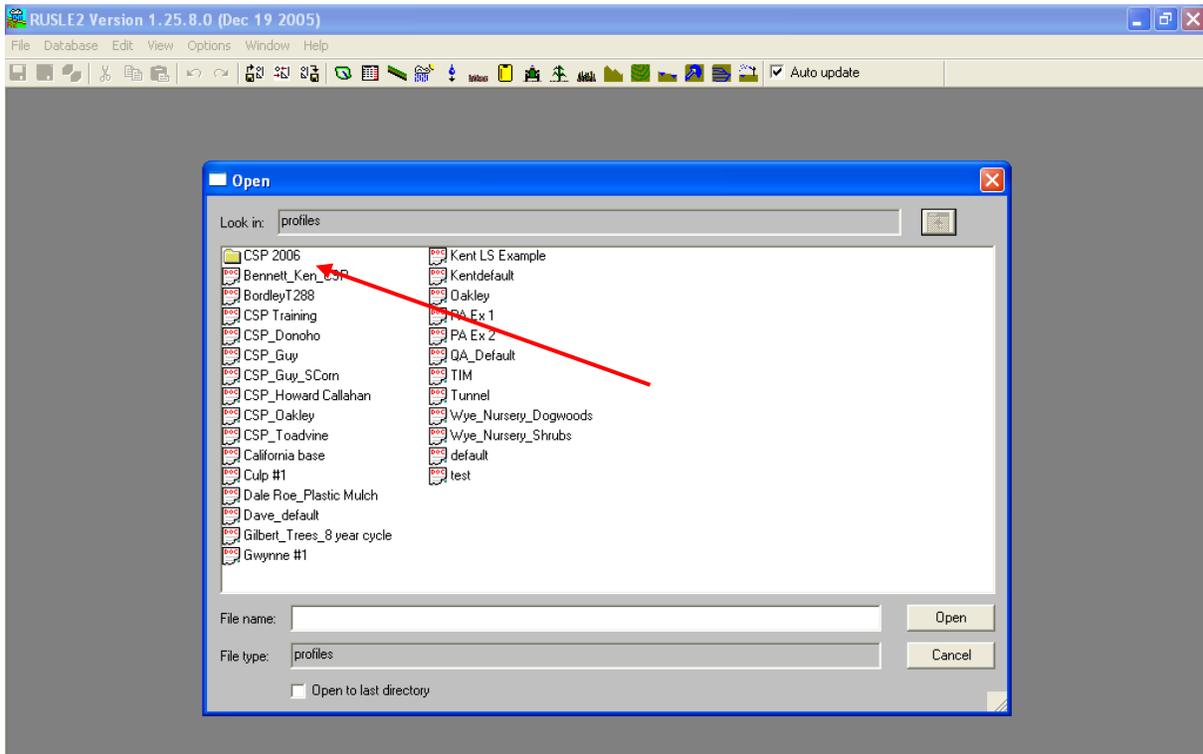
You can create folders and subfolders for Profile, Worksheet and Plan view of RUSLE2. In this example, we will create a CSP folder in Profile view.



Note the folder now created called CSP 2006. In this folder you can store all of the CSP 2006 files which were developed in Profile view.

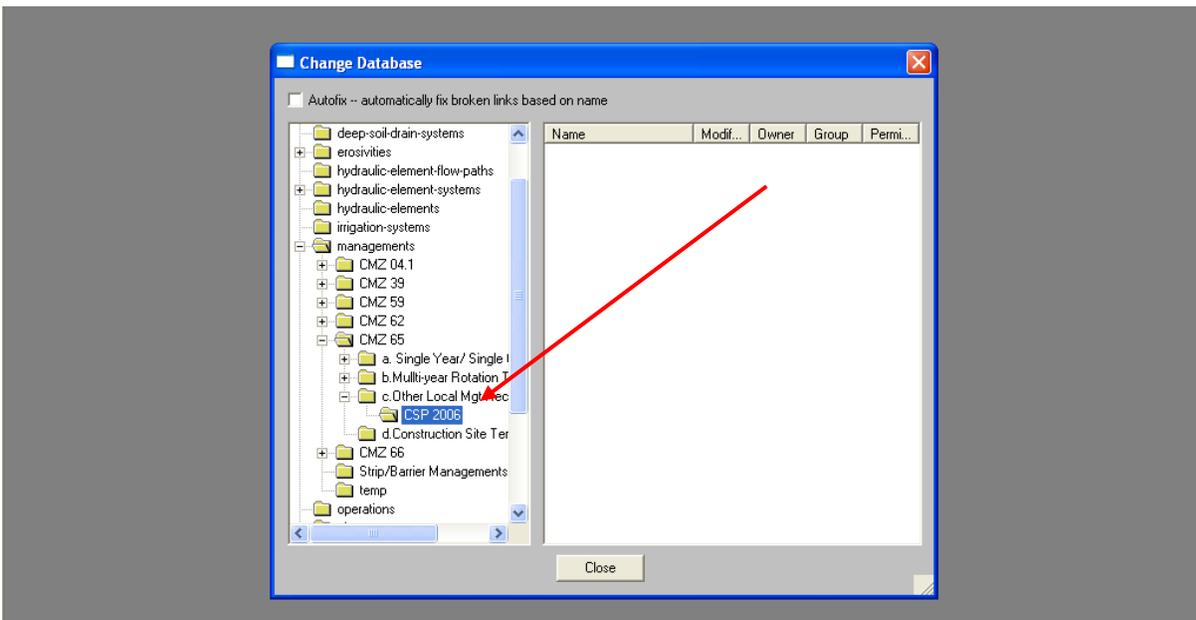


Note the created folder in the Profile view save screen. You can create these types of folders in Worksheet and Plan view as well.



### Saving files and folders for built crop rotations

The management (yellow clipboard) folder is where all of the crop rotations you build are stored. Remember, you can ONLY save crop rotations you build in the C: folder of each CMZ. You can create subfolder in the C:folder (Other Local Mgt. Records) for each CMZ by following the same steps as above. Note below the CSP 2006 management (crop rotation) folder created.



|                |
|----------------|
| ADVANCED USERS |
|----------------|

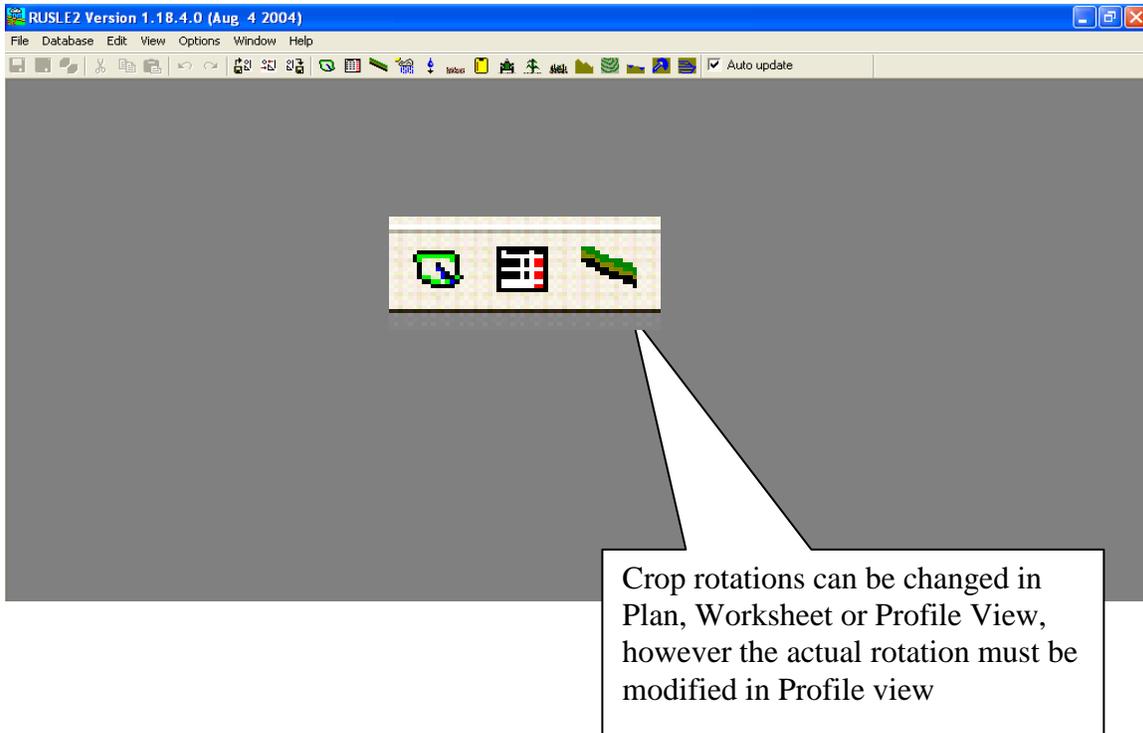
**This section is should only be used by advanced users of RUSLE2.**

### Modifying a Crop Rotation in RUSLE2

Overview: Pre-built crop rotations can be modified in RUSLE2 to provide the user with additional flexibility in determining a more accurate soil loss or soil conditioning index. Modifying the existing crop rotation will allow the user to make changes to the rotation without over-writing this existing rotation.

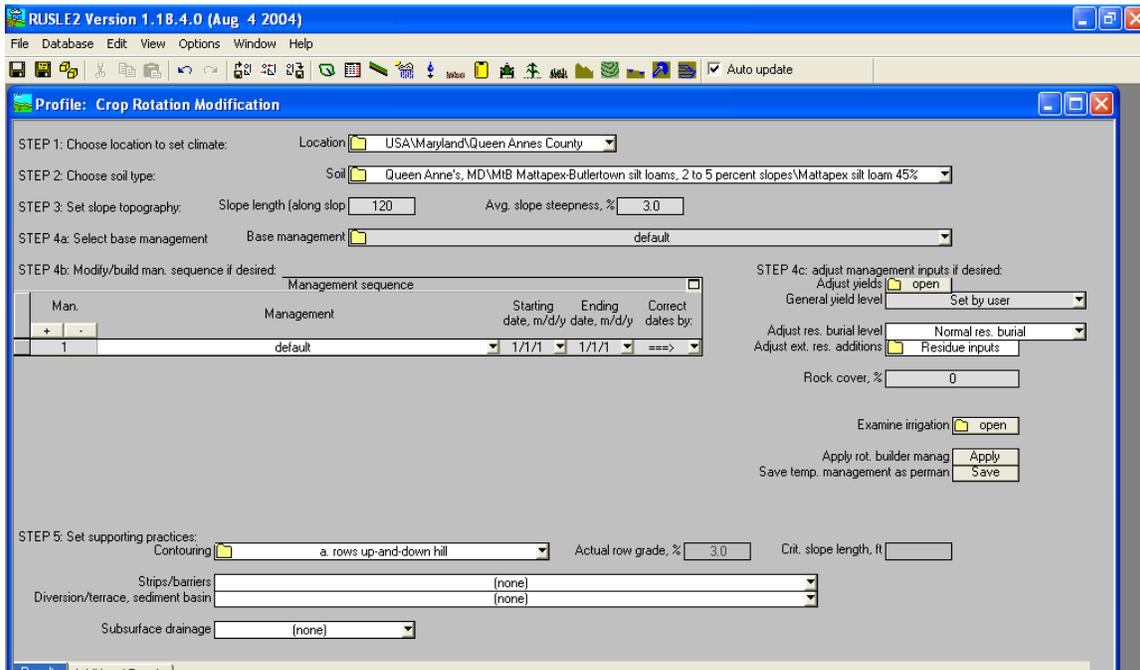
Note: Modification of crop rotations should ONLY take place in Profile View of the RUSLE2 program. Use the following steps in Profile View to modify a crop rotation:

**Step 1** – Start by opening RUSLE2 with a blank screen. Since all RUSLE2 views are linked together, you can change an existing crop rotation within Plan View, Worksheet View or Profile View. However, you will need to perform the actual crop rotation modification in Profile View.

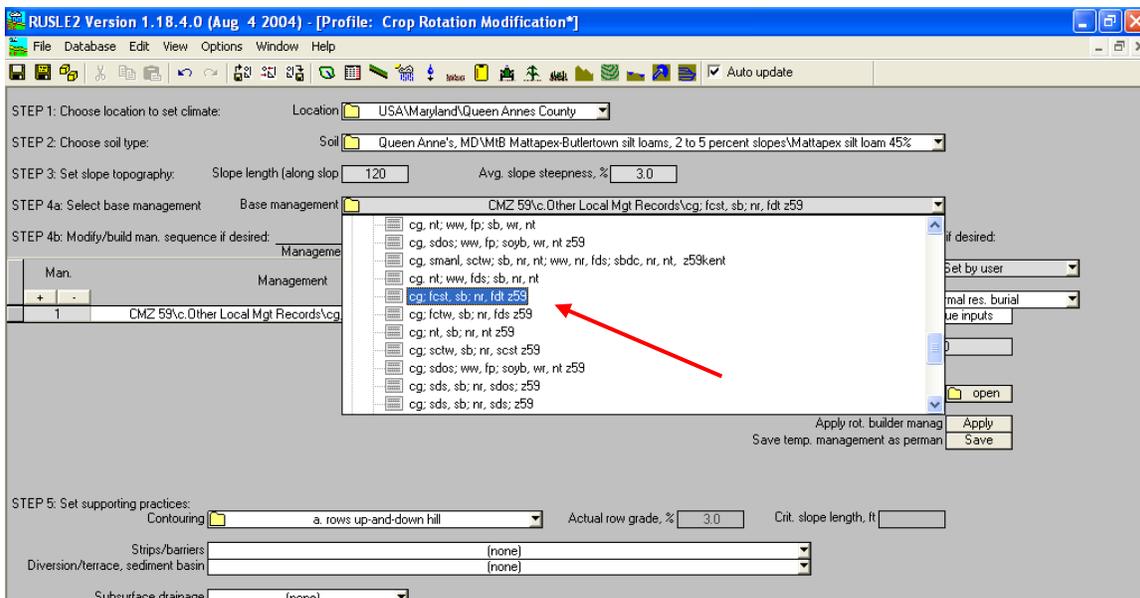


**Step 2** – For this example, we will modify an existing crop rotation in Profile View. Open Profile View and complete steps 1 through 3 in Profile View.

**Note:** Make sure you save your file to another name. Do not write over your default screen.

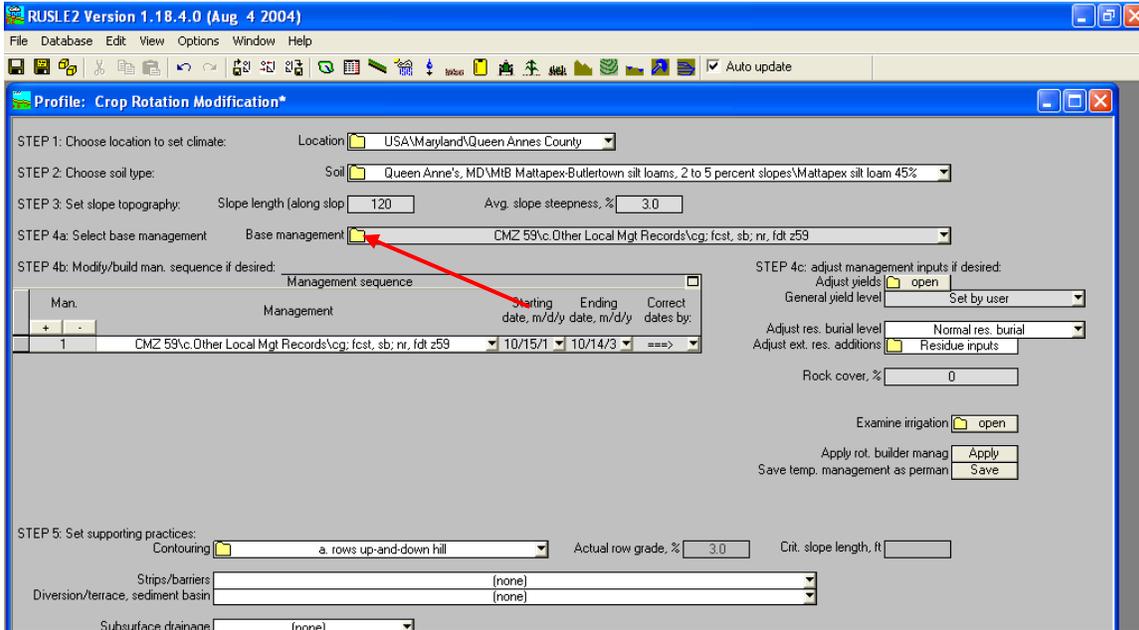


**Step 3** – Next, complete Step 4a by choosing a base management. For this example we will choose crop rotation Corn grain, fall chisel straight shank; Soybeans, narrow row, fall disk. (cg, fcst; sb, nr, fdt). You will need to choose your own crop rotation from your C: folder. This is pre-built crop rotation I chose already existed in Crop Zone 59 under my C: folder; Other Local Mgt. Records.

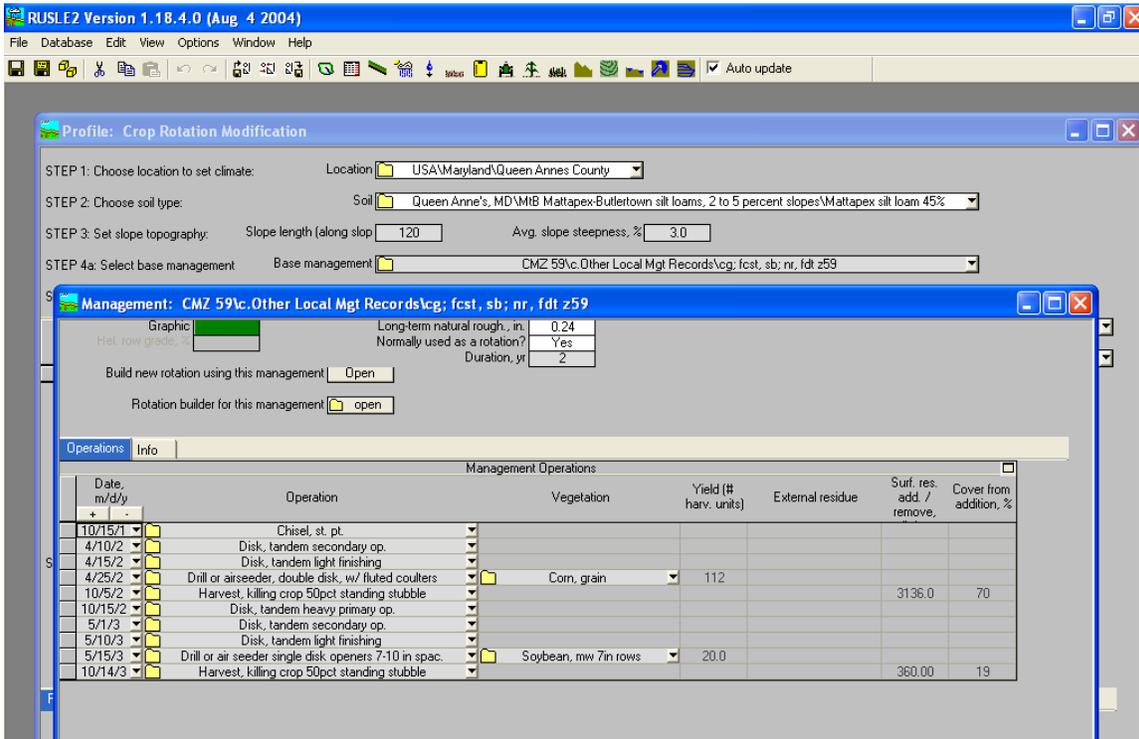


**AT THIS POINT, CLICK THE SAVE ICON AND SAVE YOUR DOCUMENT**

**Step 4** - After choosing the pre-built rotation, open the Rotation Management folder for this crop rotation by clicking on the **“Yellow” folder** next to Base Management.

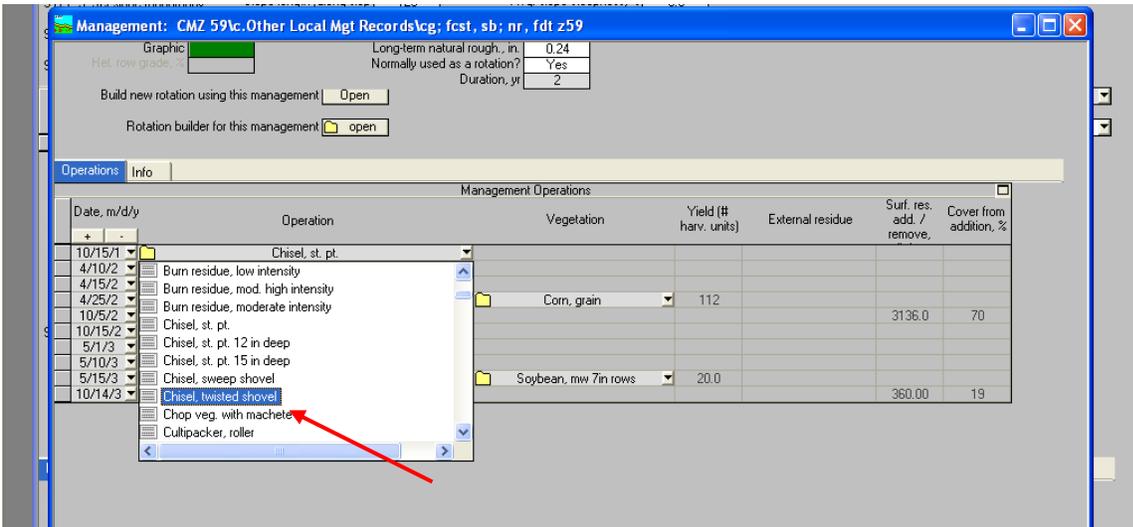


Once you click on the **“Yellow” folder** the Crop Rotation Management Screen will appear.

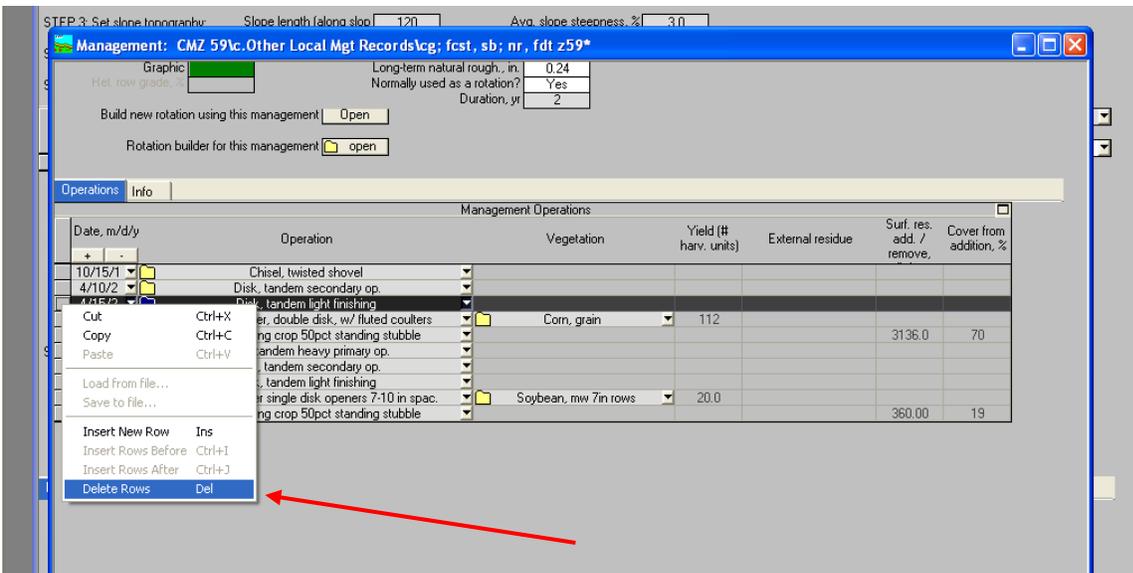


**Step 5** – You can modify any aspect of the Crop Rotation within the Crop Management Screen. For this example we will change Corn grain, chisel, **straight point** to Corn grain, chisel, **twisted shovel**. We will also remove one of the scheduled tillage practices for disking of Corn.

Click the drop down for Corn grain, chisel, st pt. and change to Corn grain, twisted shovel by double clicking on Chisel, twisted shovel.

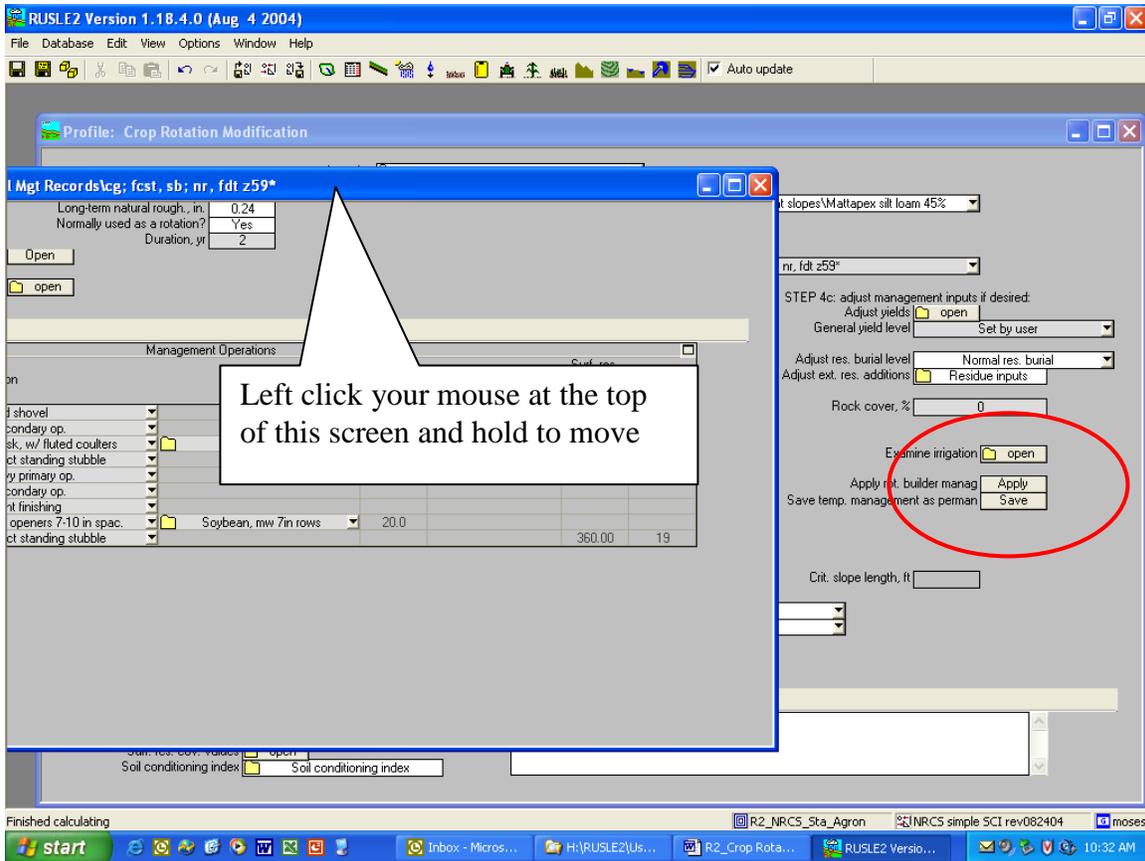


Next, under Corn grain we will remove the Disk, tandem light finishing. To do this, highlight the line Disk, tandem light finishing, right click and choose Delete rows. This will remove the entire line.

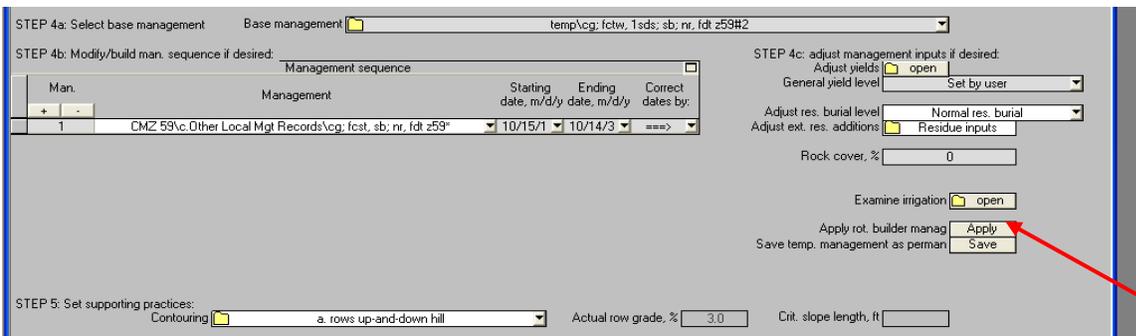


**NOTE: AFTER COMPLETING THIS STEP, DO NOT SAVE THIS ROTATION. IF YOU DO YOU WILL OVERWRITE YOUR EXISTING ROTATION.**

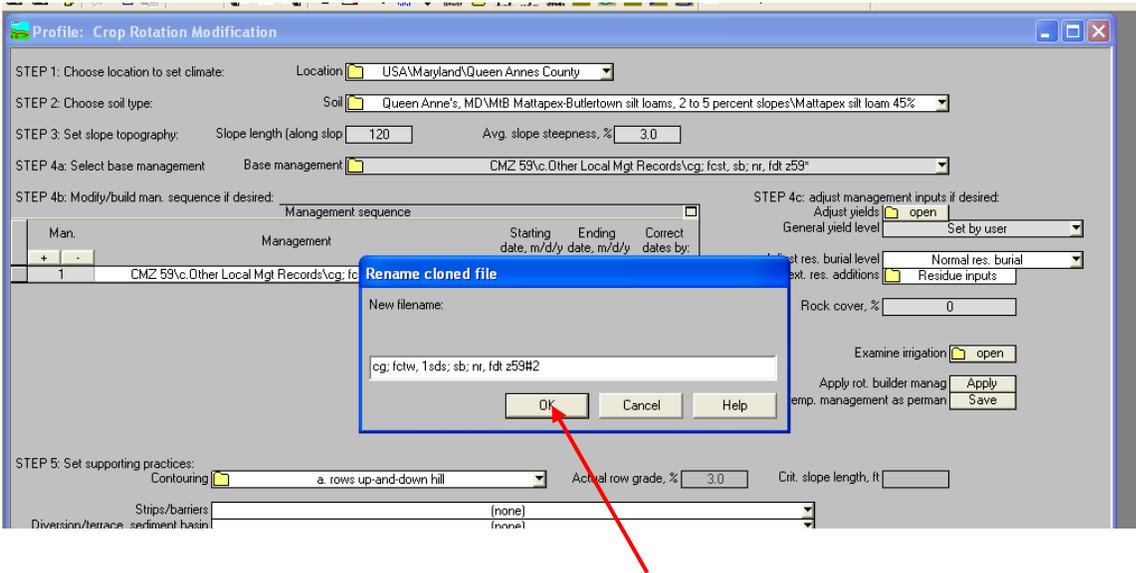
**Step 6** – Move the Crop Management Rotation Screen to the left by moving your cursor on the top of the Crop Management Screen, left click, hold and move the screen. This will allow you to access the *Apply rot. Builder Manag.* Icon in Profile View. This is where you will apply the modified or changed rotation.



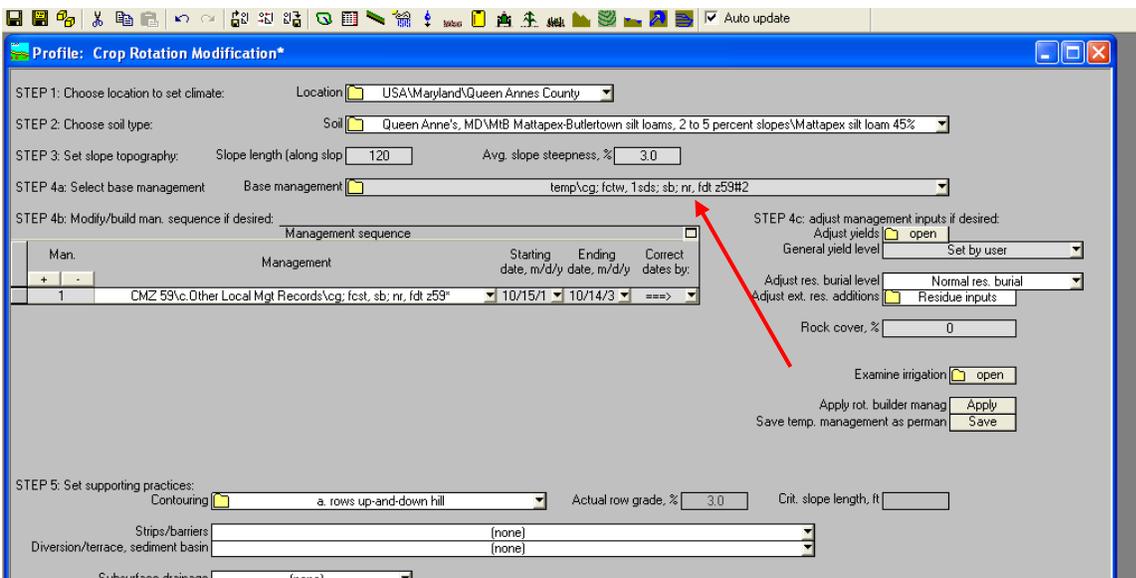
**Step 7** – Apply the modified crop rotation by clicking the “Apply” icon next to *Apply rot. Builder Manag.* This will apply the changed rotation to your profile screen.



Within the profile screen, a box will appear entitled **Rename cloned file**. By default, RUSLE2 will automatically give it a new name with an associated number (#). In this example I renamed the file to reflect corn grain, fall chisel twisted shovel and removal of one disking practice. You can name the rotation whatever you like. Once you name the file, click “OK”.



**Step 8** – Click “OK” under **Rename cloned file** to apply the rotation to your profile. Notice the name under Base Management. It is now called temp/cg, fctw, 1sds; sb, nr, fdt, Z59#2.

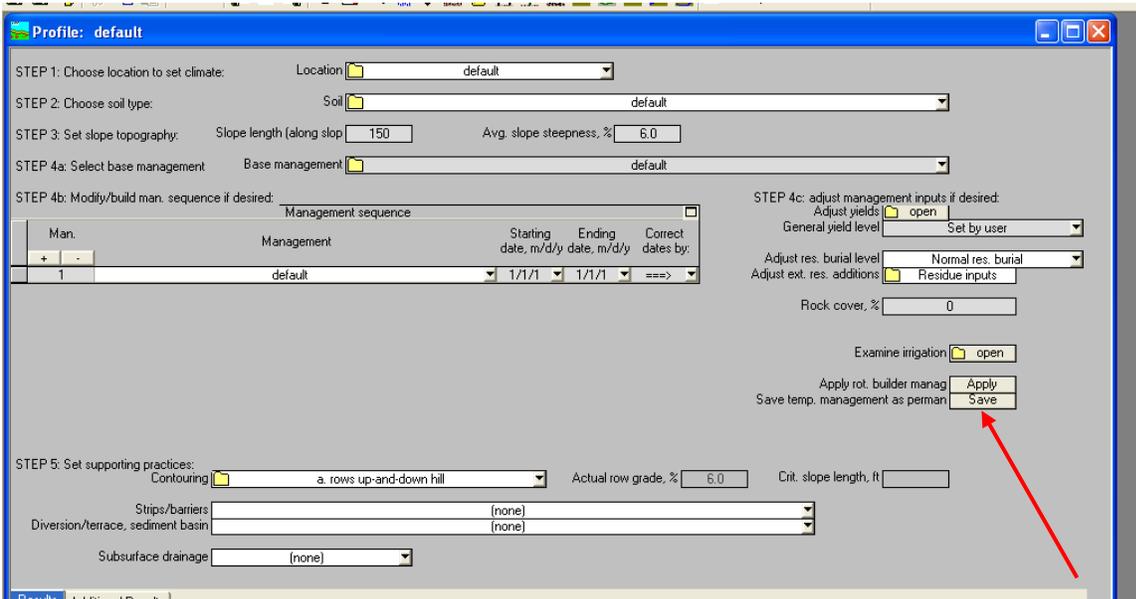


At this point you have the option to save the modified crop rotation to use at a later date or simply keep the modified crop rotation in this Profile View only.

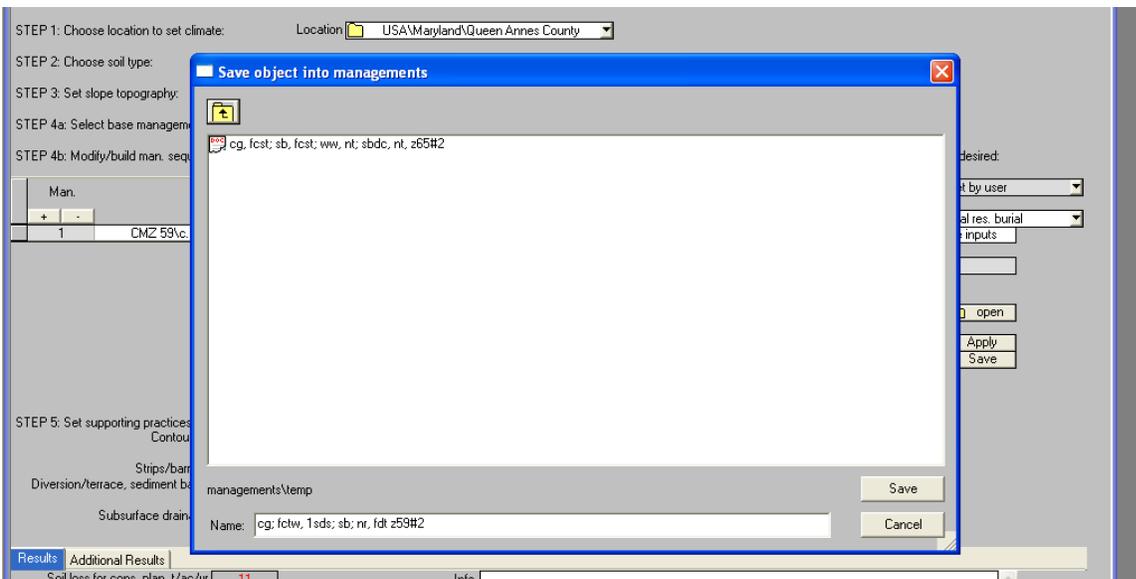
**To save the crop rotation**

If you choose to save the crop rotation, RUSLE2 will create a “temp” folder in the Management Builder screen (yellow folder) to store the modified rotation. To save the rotation, follow Step 9.

**Step 9** – To save the modified crop rotation, click the “Save” icon next to Save temp. management as perman. This will bring up a box entitled “Save object into managements”.

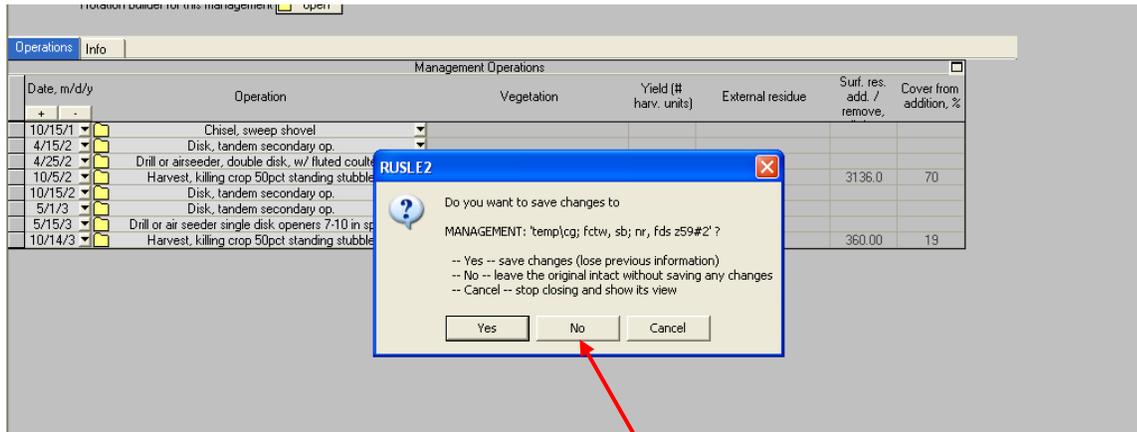


If you wish to use the name indicated below, simply click “Save”. If you wish, you can change the name and then click “Save”.



**Step 10** – Once you have saved the rotation, you will need to minimize the Profile screen and exit out of the Management Screen. RUSLE2 will ask you if you wish to save or overwrite the existing rotation. **MAKE SURE YOU CLICK “NO”**.

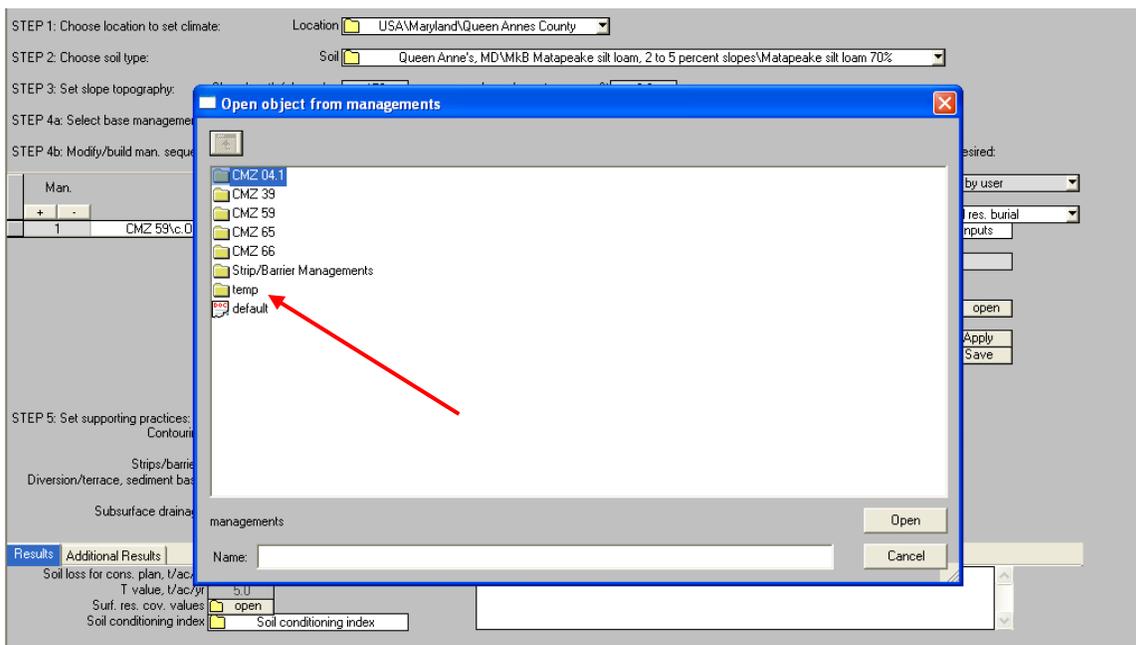
**Note: If you do not exit out of the Management Screen first and try and save your Profile, RUSLE2 may kick you out of the program.**



Once you exit out of the Crop Management Screen, you can now save your Profile and continue with your RUSLE2 soil loss calculation.

Complete steps 4c through 5 to finish the RUSLE2 soil loss calculation.

Note: If you plan to use the modified Crop Rotation again, it is located in a file called “Temp” in your Crop Management folder (yellow folder). Simply click on the yellow folder icon, double click on “temp” and your modified crop rotation should be there.



## Updating the “moses” database

About every two to three months you should update your S: shared “moses” database. The “moses” database is basically the heart of the RUSLE2 program. The “moses” database is periodically updated from your State Agronomist and posted to the RUSLE2 website. This database contains all managements including crop tillage, planting, harvesting, crops and supporting practices such as contouring, strips/barriers and diversions. It is VERY important to keep this database updated with the latest managements to ensure accurate RUSLE2 calculations. Each field office has been assigned a person who will be responsible for keeping the database updated. Consult with this person to verify this has been done or follow the instructions below to update your S: shared “moses” database.

Note: You should have your “moses” database set to the S (Shared Drive). The path should be set to S:\Service Center\NRCS\RUSLE2\county\_moses.

**PERFORMING THESE STEPS WILL NOT OVERWRITE YOUR EXISTING DATABASE, HOWEVER THIS MAY UPDATE YOUR UNDERLINING DATA FOR CROPS, MANAGEMENT PRACTICES, ETC...**

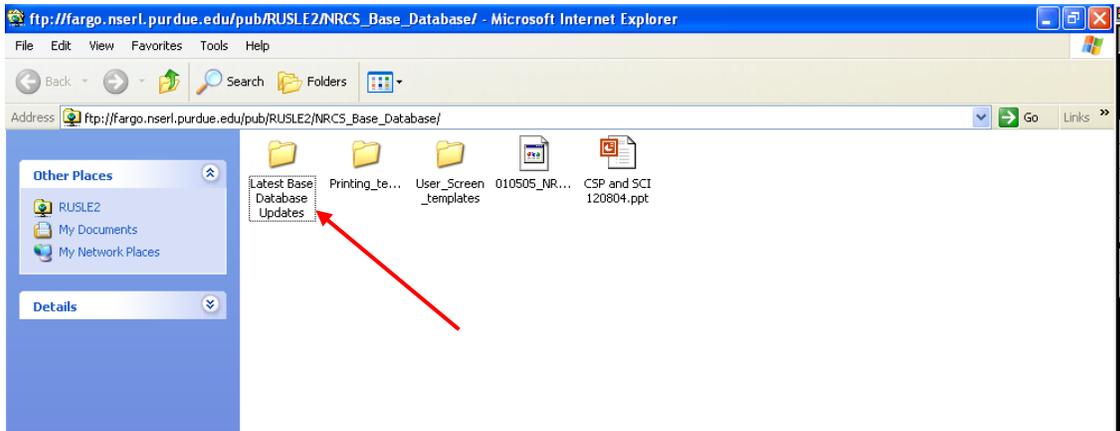
### Step 1: Download the Database Update File from the RUSLE2 website

Go to the website [http://fargo.nser1.purdue.edu/rusle2\\_dataweb/RUSLE2\\_Index.htm](http://fargo.nser1.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm). Next, under *Base Database & Misc Files* click on **Download File**

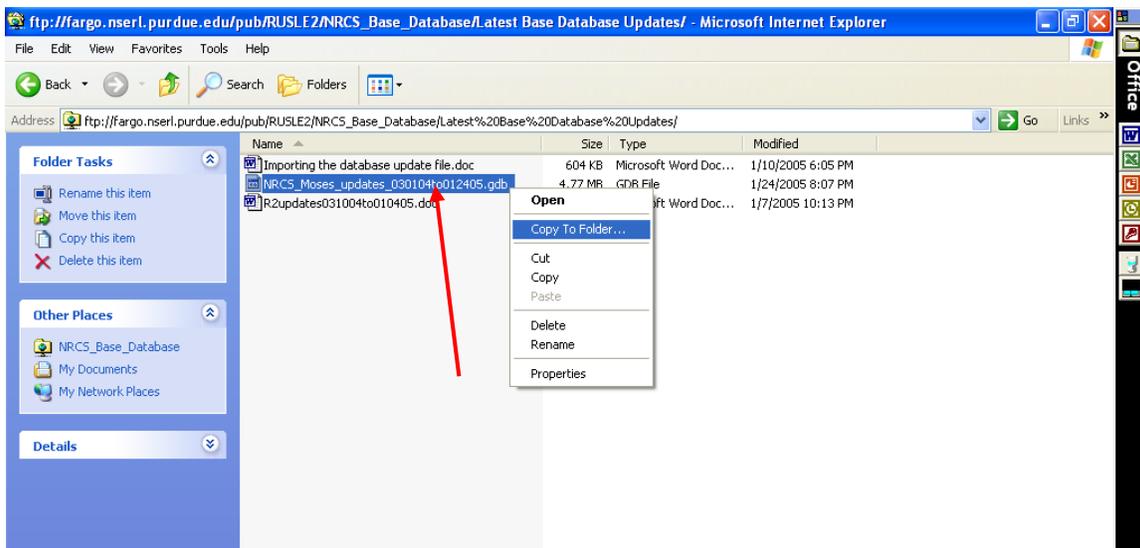
The screenshot shows a web browser window with the following content:

- Browser Title:** Revised Universal Soil Loss Equation, Version 2 - Microsoft Internet Explorer
- Address Bar:** http://fargo.nser1.purdue.edu/rusle2\_dataweb/RUSLE2\_Index.htm
- Logos:** USDA, NRCS, Agricultural Research Service, and Purdue University.
- Main Heading:** Revised Universal Soil Loss Equation, Version 2 (RUSLE2)
- Sub-headers:** Official NRCS RUSLE2 Program, Official NRCS Database
- Text:** This site contains the official NRCS version of RUSLE2. It is the only version of RUSLE2 to be used for official purposes by NRCS field offices. The NRCS developed and maintains the database components on this site. These components comprise the Official NRCS RUSLE2 Database. The official NRCS RUSLE2 database is the only database to be used for official purposes by NRCS field office employees.
- Text:** RUSLE2 is an upgrade of the text-based RUSLE DOS version 1. It is a computer model containing both empirical and process-based science in a Windows environment that predicts rill and interrill erosion by rainfall and runoff. The USDA Agricultural Research Service (ARS) is the lead agency for...
- Navigation Links (Left Sidebar):**
  - Home
  - About RUSLE2 Technology
  - RUSLE2 Program File
    - Installation Instructions
    - Download File
  - Base Database & Misc Files
    - Instructions
    - Download File
  - Climate Data
    - Instructions
    - Data Files
  - Crop Management Templates
    - Instructions
    - Crop Management Zone Maps
    - Data Files
  - Soils Data

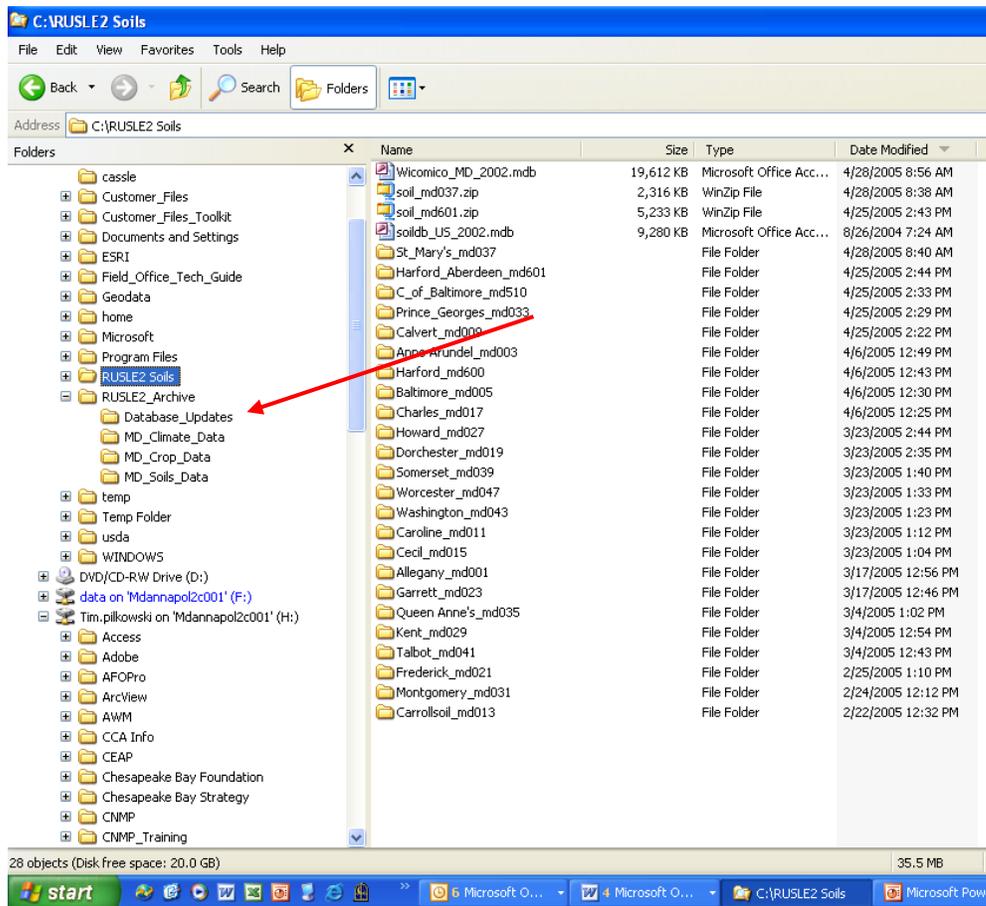
Double click on the Folder **Latest Base Database Updates**.



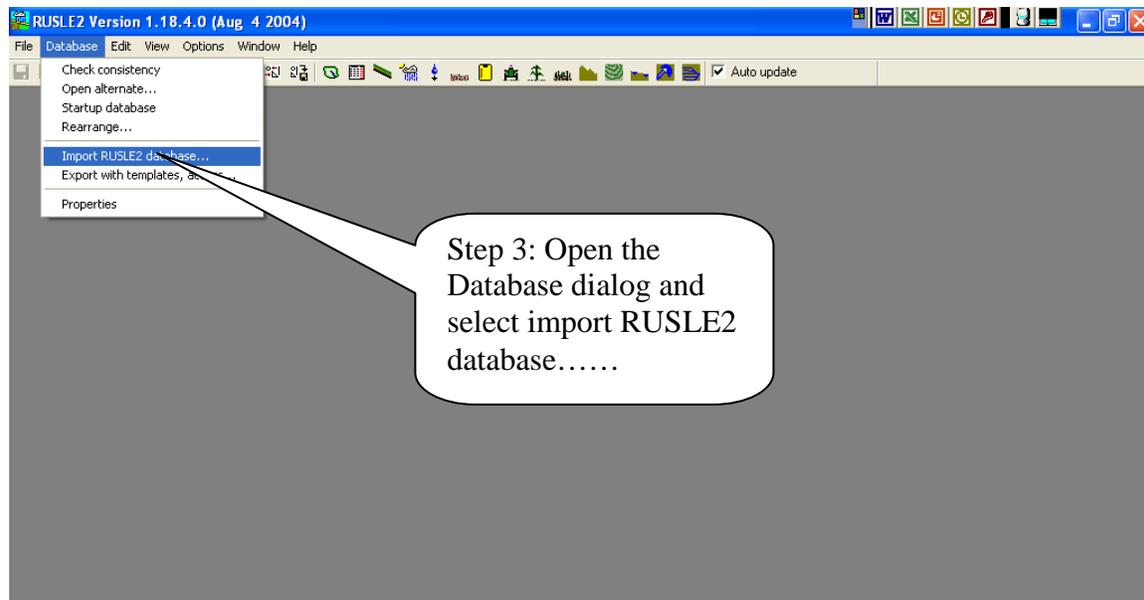
Select the latest file in this folder. NOTE: There should be only one file here with a name such as the following: **NRCS\_Moses\_updates030104to080105.gdb**. Right click and select *Copy to Folder*



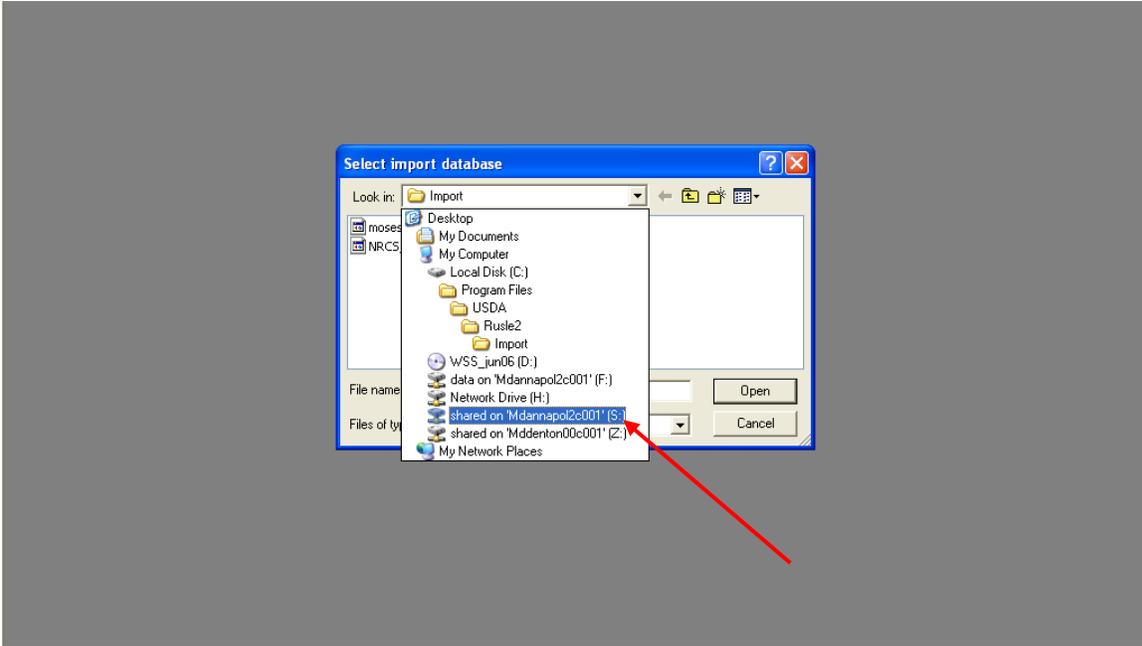
**Step 2:** Copy the file directly into your RUSLE2 Archive Folder on your shared drive under Database\_Updates. You should store your database update files in this location.



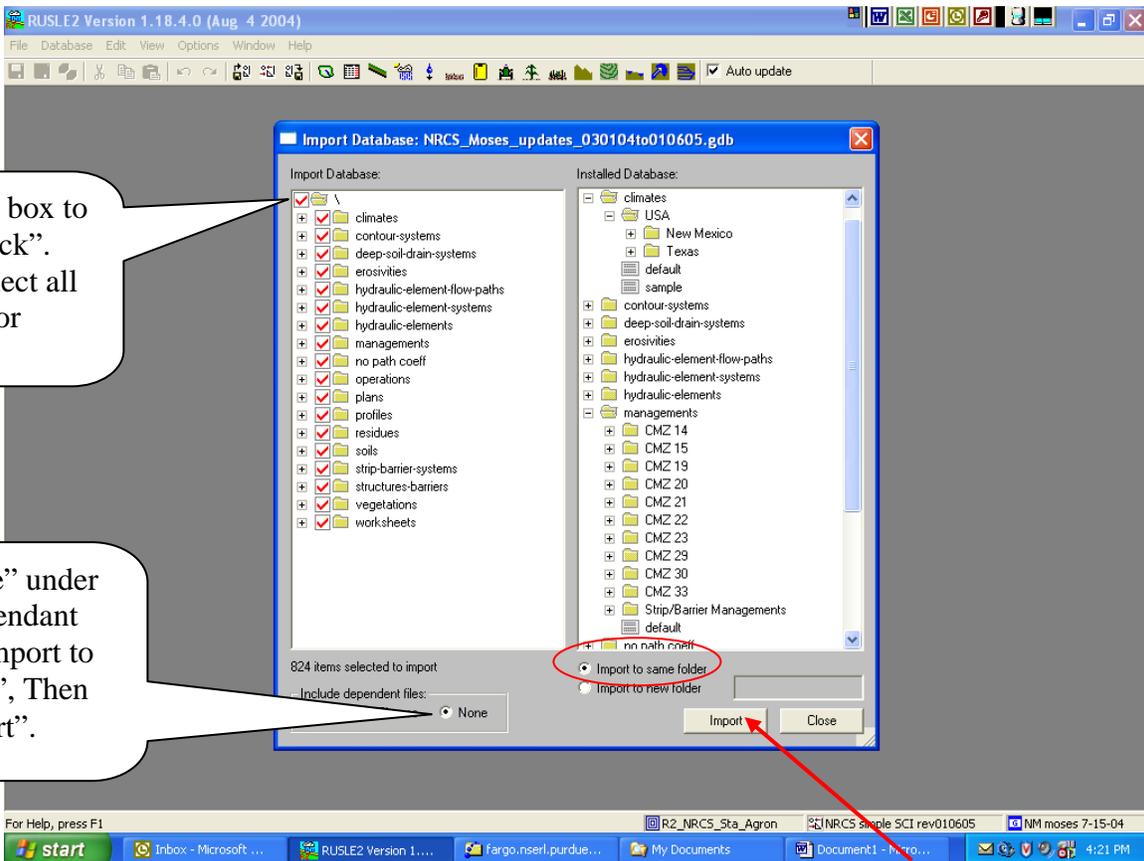
**Step 3:** Once the file is copied, open the RUSLE2 program. Go to Database and select Import RUSLE2 database



**Step 4:** Navigate to the Rusle2 folder where you saved the update file. Again, it should be located at \\mdyouroffice\shared\Service Center\NRCS\RUSLE2\RUSLE2\Dabase Updates. Select the database update file you recently saved there. Click Open.



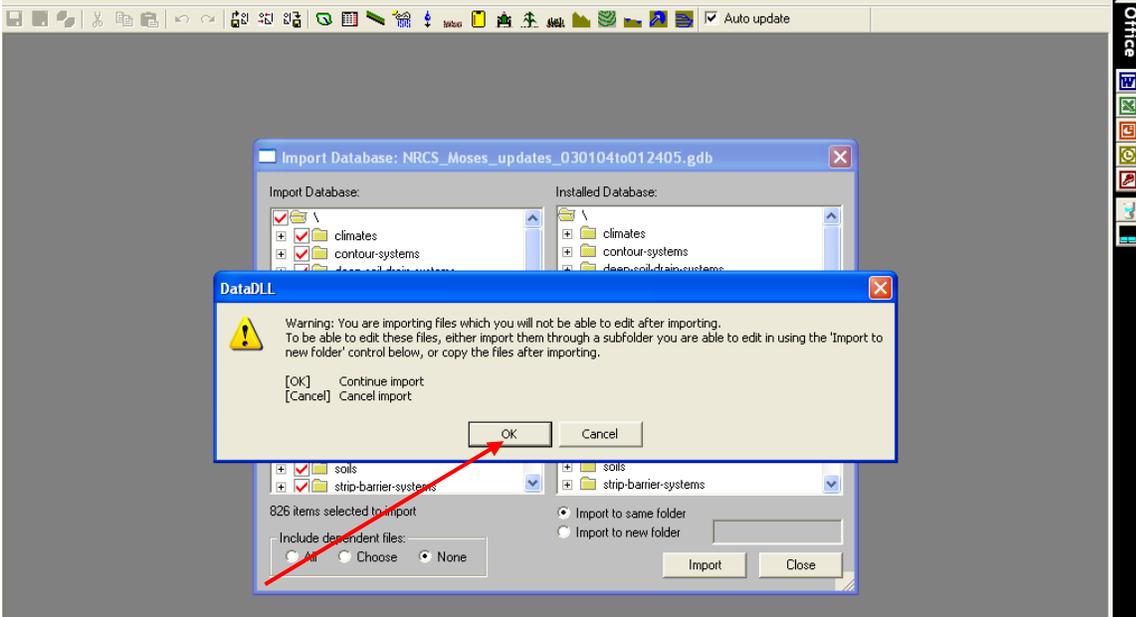
**Step 5:** Once the database import screen appears, click the **upper most box** to auto select the contents of all subfolders. Click **“None”** under Include dependant files. Make sure **Import to same folder** is clicked also. Next click **“Import”**. All folders need to be checked since there are updates in many areas of RUSLE2 that need to be imported into your database.



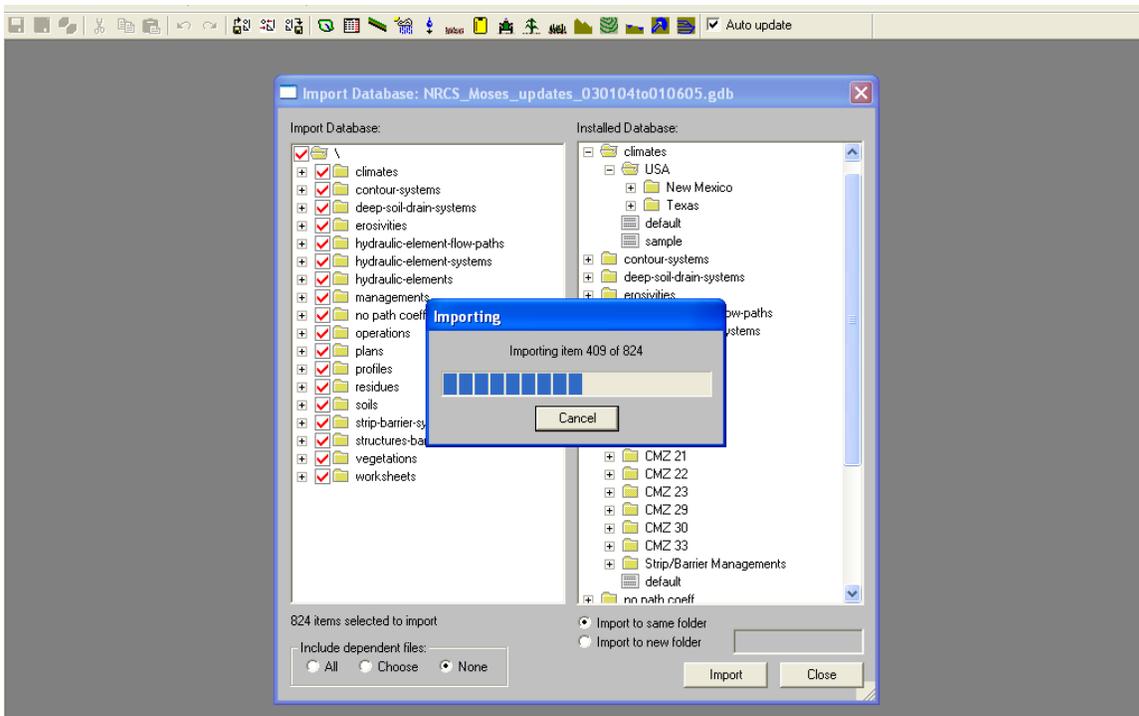
Click in this box to place a “check”. This will select all subfolders for importing.

Click “None” under Include dependant files and “Import to same folder”, Then click “Import”.

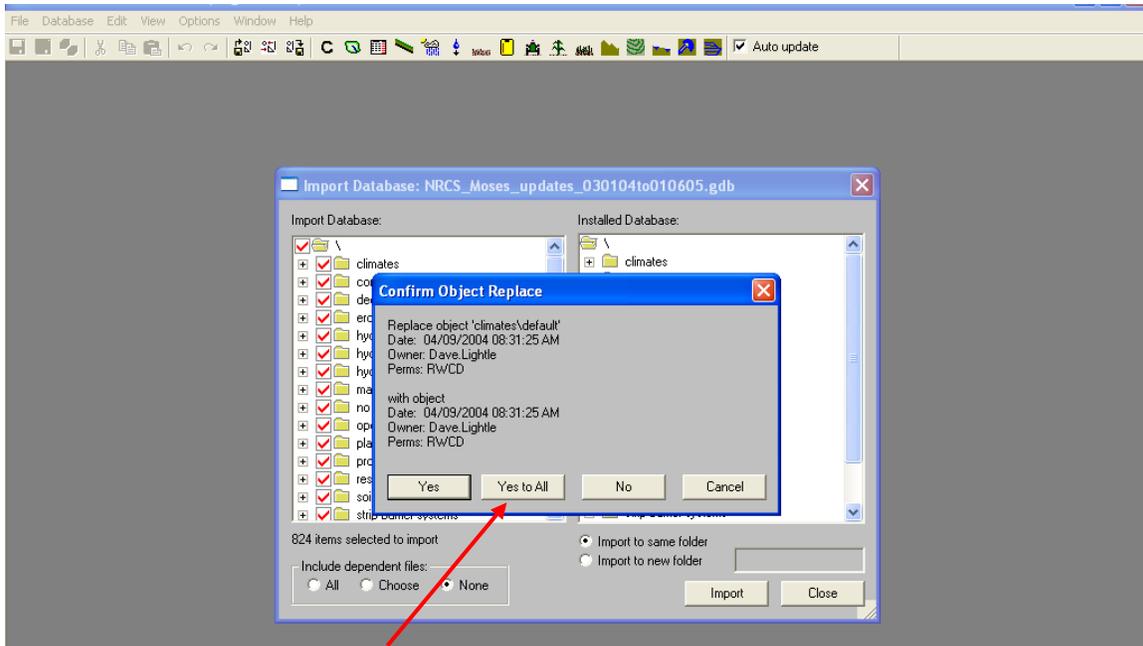
When the “Warning” box appears click **OK**



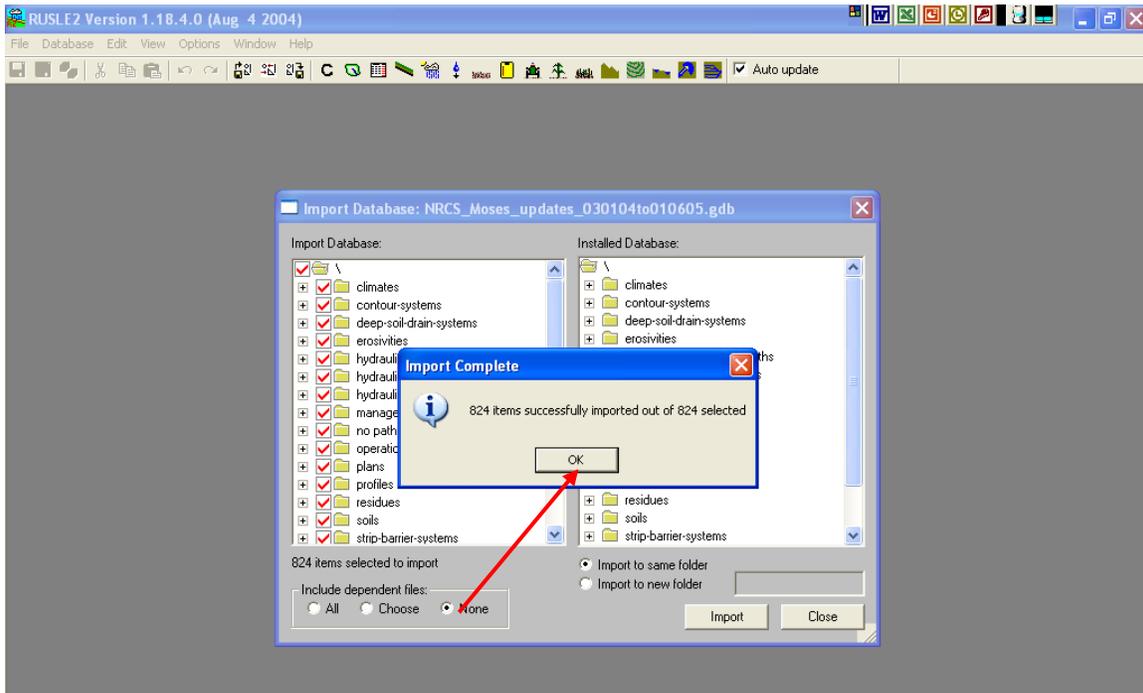
Let the import process run its course. Be patient. This may take a few seconds. Do not click the mouse or click cancel.



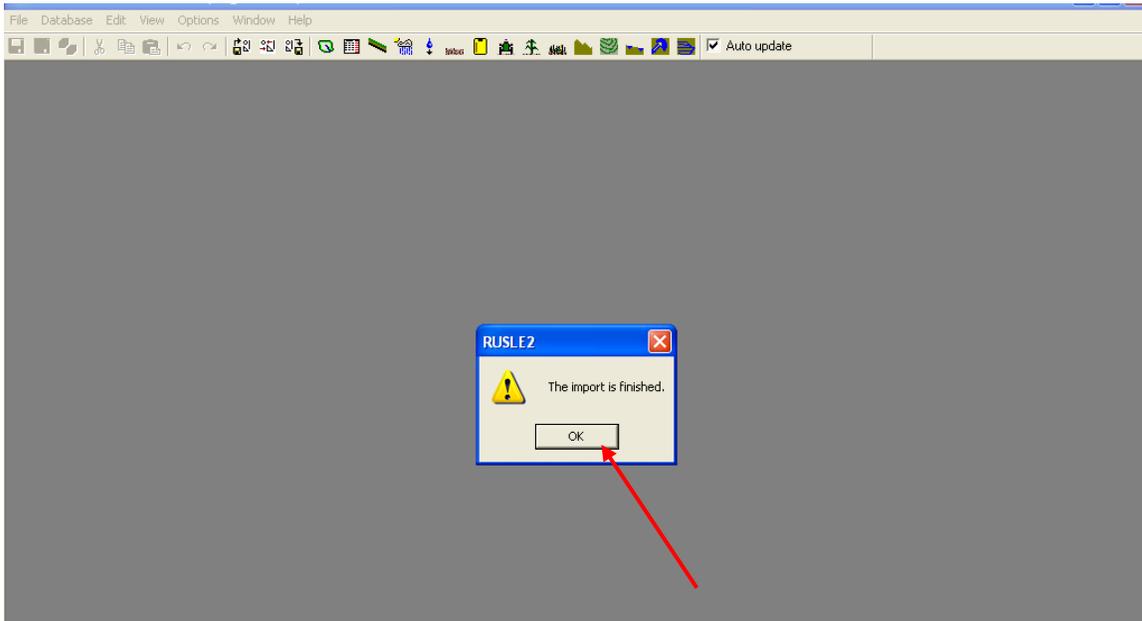
**If** any *Confirm Object Replace* message appears, choose “Yes to all”. This may or may not appear.



When the *Import Complete* Box appears, click **OK**.



Click “OK” to acknowledge the import is complete and to close the import process.



You are now finished and can resume using RUSLE2 with your updated database.

# APPENDIX 1

Example Print Screens  
Using Word





**RUSLE2 Profile Erosion Calculation Record**

Info:

**File:** profiles\Alleghenydefault

**Inputs:**

Location: Allegheny County  
 Soil: ALLEGHENY silt loam 100%  
 Slope length (horiz): 150 ft  
 Avg. slope steepness: 6.0 %

| <i>Management</i> | <i>Vegetation</i> | <i>Yield units</i> | <i>Yield (# of units)</i> |
|-------------------|-------------------|--------------------|---------------------------|
|                   |                   |                    |                           |

Contouring: a. rows up-and-down hill  
 Strips/barriers: (none)  
 Diversion/terrace, sediment basin: (none)  
 Subsurface drainage: (none)  
 Adjust res. burial level: Normal res. burial

**Outputs:**

Soil loss erod. portion: 34 t/ac/yr  
 Detachment on slope: 34 t/ac/yr  
 Soil loss for cons. plan: 34 t/ac/yr  
 Sediment delivery: 34 t/ac/yr

Crit. slope length:  
 Surf. cover after planting: 0 %

| <i>Date</i> | <i>Operation</i>                             | <i>Vegetation</i> | <i>Surf. res. cov. after op, %</i> |
|-------------|--|-------------------|------------------------------------|
| 11/1/0      | Chisel, sweep shovel                         |                   | 0                                  |
| 5/1/1       | Cultivator, field 6-12 in sweeps             |                   | 0                                  |
| 5/5/1       | Chisel, st. pt.                              |                   | 0                                  |
| 10/10/1     | Harvest, killing crop 50pct standing stubble |                   | 0                                  |



**RUSLE2 Worksheet Erosion Calculation Record**

Info:

**Inputs:**

Tract #: A1234

Owner name: John Doe

Field name: 1

Location: Allegany County

Soil: ALLEGHENY fine sandy loam 100%

Slope length (horiz): 150 ft

Avg. slope steepness: 6.0 %

**Outputs:**

| <i>Management</i>  | <i>Contouring</i>               | <i>Strips / barriers</i> | <i>Diversions/terrace, sediment basin</i> | <i>Soil loss erod. portion, t/ac/yr</i> | <i>Soil detachment, t/ac/yr</i> | <i>Cons. plan. soil loss, t/ac/yr</i> | <i>Sed. delivery, t/ac/yr</i> |
|--|---------------------------------|--------------------------|---|---|---------------------------------|---------------------------------------|-------------------------------|
| a. Single Year/<br>Single Crop<br>Templates\corn,<br>grain\Corn,<br>grain; fcst, z65 | a. rows<br>up-and-<br>down hill | (none)                   | (none)                                    | 30                                      | 30                              | 30                                    | 30                            |



**RUSLE2 Erosion Calculation Record**

Owner name: Type client name here.

Info: Type information here about the farm or treatments being evaluated. This information will appear in the "plan summary report" which will be viewed by the client.

**File:** plans\ClientNameTP

**Access Group:** R2\_NRCS\_Fld\_Office

**Inputs:**

Location: Allegany County

**Results:**

| <i>Field name</i> | <i>Description</i>  | <i>Cons. plan. soil loss, t/ac/yr</i> | <i>Sed. delivery, t/ac/yr</i> |
|-------------------|---|---------------------------------------|-------------------------------|
| 1                 | Same crop rotation with contour farming on perfect row grade, 50 foot cool season filter strip, and one diversion in middle of slope. | 2.9                                   | 0.98                          |
| 2                 | corn silage with spring manure, no tillage  | 1.6                                   | 1.6                           |
| 3                 | corn grain, fall plow   | 4.4                                   | 4.4                           |
| 4                 | corn grain, strip tillage, wide row   | 0.40                                  | 0.40                          |



Rusle Program Version: Sep 22 2003  
 Rusle Science Version: 8/13/2003  
 Data Base: moses

## RUSLE2 Erosion Calculation Record#2

**File:** plans\ClientNameTP  
**Access Group:** R2\_NRCS\_Fld\_Office

**Inputs:**

Owner name: Type client name here.

Location: Allegany County

Info: Type information here about the farm or treatments being evaluated. This information will appear in the "plan summary report" which will be viewed by the client.

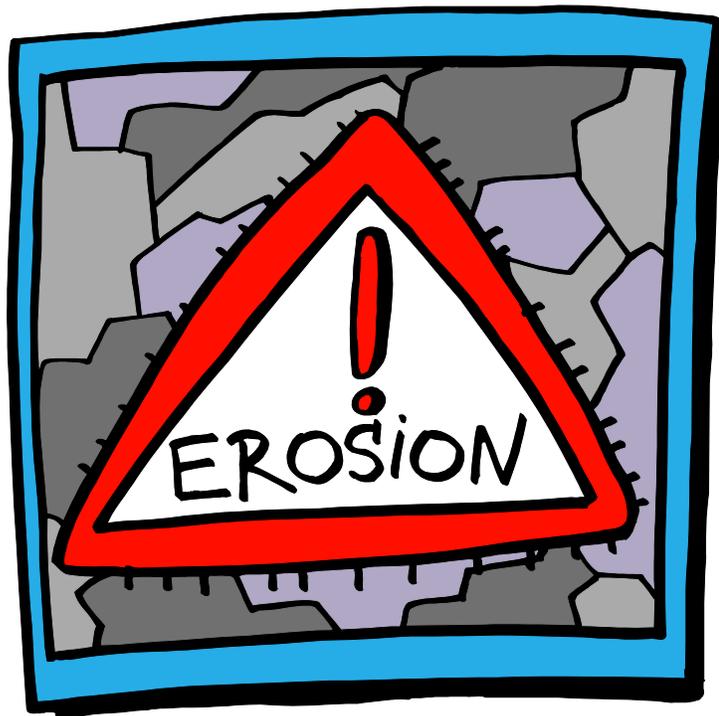
| <i>Field name</i> | <i>Soil</i>  | <i>Slope T Value, t/ac/yr</i> | <i>Slope length, ft</i> | <i>Slope steepness, %</i> |
|-------------------|--|-------------------------------|-------------------------|---------------------------|
| 1                 | Allegany, MD\AbB<br>ALBRIGHTS SILT LOAM,<br>0 TO 8 PERCENT<br>SLOPES\ALBRIGHTS silt<br>loam 95%                          | 4.0                           | 150                     | 6.0                       |
| 2                 | Allegany, MD\AIA<br>ALLEGHENY SILT LOAM,<br>0 TO 3 PERCENT<br>SLOPES\ALLEGHENY silt<br>loam 100%                         | 5.0                           | 150                     | 6.0                       |
| 3                 | Allegany, MD\AIA<br>ALLEGHENY SILT LOAM,<br>0 TO 3 PERCENT<br>SLOPES\ALLEGHENY silt<br>loam 100%                         | 5.0                           | 200                     | 3.0                       |
| 4                 | Allegany, MD\AIC2<br>ALLEGHENY SILT LOAM,<br>8 TO 15 PERCENT<br>SLOPES, MODERATELY<br>ERODED\ALLEGHENY<br>silt loam 100% | 5.0                           | 150                     | 6.0                       |

**Results:**

| <i>Field name</i> | <i>Management</i>   | <i>Contouring system</i>           | <i>Support practices</i>  | <i>Terrace/diversion system</i>                  | <i>Cons. plan. soil loss, t/ac/yr</i> | <i>Sed. delivery, t/ac/yr</i> | <i>Surf. cov. after planting, %</i> |
|-------------------|---|------------------------------------|---|--|---------------------------------------|-------------------------------|-------------------------------------|
| 1                 | temp\Corn, grain; fcst, soybean,nr,fcs  | c. perfect contouring no row grade | Filter strips\Actual width\50-ft Cool season grass filter strip | 1 Diversion 0.05% grade in middle of RUSLE slope | 2.9                                   | 0.98                          |                                     |
| 2                 | CMZ 65\a. Single Year/ Single Crop Templates\corn, silage, spring manure\bedded\Corn, silage, smanb; nts, z65 | a. rows up-and-down hill           | -- none --  | -- none --                                       | 1.6                                   | 1.6                           | 75                                  |
| 3                 | CMZ 65\a. Single Year/ Single Crop Templates\corn, grain\Corn, grain; fp, z65                                 | a. rows up-and-down hill           | -- none --  | -- none --                                       | 4.4                                   | 4.4                           | 2.4                                 |
| 4                 | CMZ 65\a. Single Year/ Single Crop Templates\corn, grain\Corn, grain; nts, z65                                | c. perfect contouring no row grade | -- none --  | -- none --                                       | 0.40                                  | 0.40                          | 61                                  |

# APPENDIX 2

Manure, Tillage and Planting Operations  
Naming Codes and Abbreviations



## Manure Operations Naming Codes and Abbreviations

The following is a list of manure operation codes and abbreviations in bold, used in the preparation of crop templates for the crop management zones, 59, 65, 4.1 (Intermediate Planting Dates), and 66. Listed below 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 data bases. The manure types were selected to represent the most common types of manure used in each of the multi-state CMZs. The decomposition rates, which are included in the data bases. You can see the difference on the average as to the actual dry matter that is applied. Dry matter applied 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  |
| <b>manl</b>                 | Liquid spreader (50% infiltration)    | 6000 gal @ 2% dry matter                        |
| <b>maninjhd</b>             | Injector – high disturbance 30” (50%) | 6000 gal @ 2% dry matter                        |
| <b>maninjld</b>             | Injector – low disturbance 15” (30%)  | 6000 gal @ 2% dry matter                        |
| MANURE, MODERATE BEDDING    |                                       | 3000  |
| <b>manb</b>                 | Manure spreader, solid & semi-solid   | 6 tons @ 25% solids                             |
| MANURE, POULTRY             |                                       | 3000  |
| <b>manp</b>                 | Manure spreader, solid & semi-solid   | 6 tons @ 50% solids                             |
| MANURE, SEMI-SOLID & SLURRY |                                       | 3000  |
| <b>manss</b>                | Manure spreader, slurry               | 10 tons @ 15% solids or<br>5000 gal @ 7% solids |

## **Tillage Operations Naming Codes and Abbreviations**

The following is a listing of tillage operation codes and abbreviations used in the preparation of crop templates for the crop management zones. 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.

### CLEAN TILLAGE

#### PRIMARY TILLAGE

Moldboard Plow      **fp** (fall) **sp** (spring)

#### SECONDARY TILLAGE

Disk, tandem heavy primary  
Disk, tandem light finishing  
Harrow, coiled tine

### CONSERVATION TILLAGE

#### CHISEL TILLAGE OPTIONS

#### PRIMARY TILLAGE

Chisel, twisted      **ftw** (fall) **sctw** (spring)  
(high tillage/low residue)

Chisel, straight      **fcst** (fall) **scst** (spring)  
(moderate tillage/moderate residue)

Chisel, sweeps      **fswp** (fall) **scswp** (spring)  
(low tillage/high residue)

#### SECONDARY TILLAGE

Disk, tandem heavy primary  
Disk, tandem light finishing

Disk, tandem heavy primary  
Disk, tandem light finishing

Cultivator, field 6-12" sweeps

**DISK OPTIONS WITH LOW TO HIGH RESIDUE OPTIONS**

PRIMARY TILLAGE

Disk, heavy/offset     **fdos** (fall) **sdos** (spring)  
 (high tillage/low residue)

Disk, tandem heavy     **fdt** (fall) **sd** (spring)  
 (moderate tillage/moderate residue)

Disk, tandem             **fds** (fall) **sds** (spring)  
 (low tillage/high residue)

SECONDARY TILLAGE

Disk, tandem heavy primary  
 Disk, tandem light finishing

Disk, tandem heavy primary  
 Disk, tandem light finishing

Disk, tandem secondary

**FIELD CULTIVATOR OPTIONS**

1 & 2 in symbol denotes the number of implement passes

PRIMARY TILLAGE

Cultivator, field; 6-12" sweeps  
**ffc1** (fall) **sfc1** (spring)

Cultivator, field; 6-12" sweeps  
**ffc2** (fall) **sfc2** (spring)

SECONDARY TILLAGE

none

Cultivator, field; 6-12" sweeps

**OTHER TILLAGE OPTIONS**

**Seedbed Conditioner**

**1 Pass Vertical-Till or Turbo-Till High residue crop STIR Value\* <30**

If vertical tillage is used to chop stalks or minimally incorporate manure with surface residue, the STIR value cannot exceed 30, only one pass can be made in the field, and only on a high residue crop.



## Planting Operations Naming Codes and Abbreviations

The following is a listing of planting operation codes and abbreviations used in the preparation of crop templates for the crop management zones. Listed below the planting options are the codes or abbreviations in **bold**, i.e. **nt**, that are part of the crop template name.

### GENERAL PLANTING NOTE

For crops that may be drilled or planted, such as soybeans or narrow row corn, the abbreviations will be:

Narrow row: **nr**

Wide row: **wr**

### NO-TILL NOTES

Drilled crops, no-till single coulter on 7-10" spacing: **nt**

Planted crops, no-till 15" or wider rows with fluted coulter: **nt**

### STRIP/ZONE TILL NOTES

Planted crops, strip till, wide row: **nts**

### RIDGE TILL NOTES

Planted crops, ridge till, wide row: **rt**

