

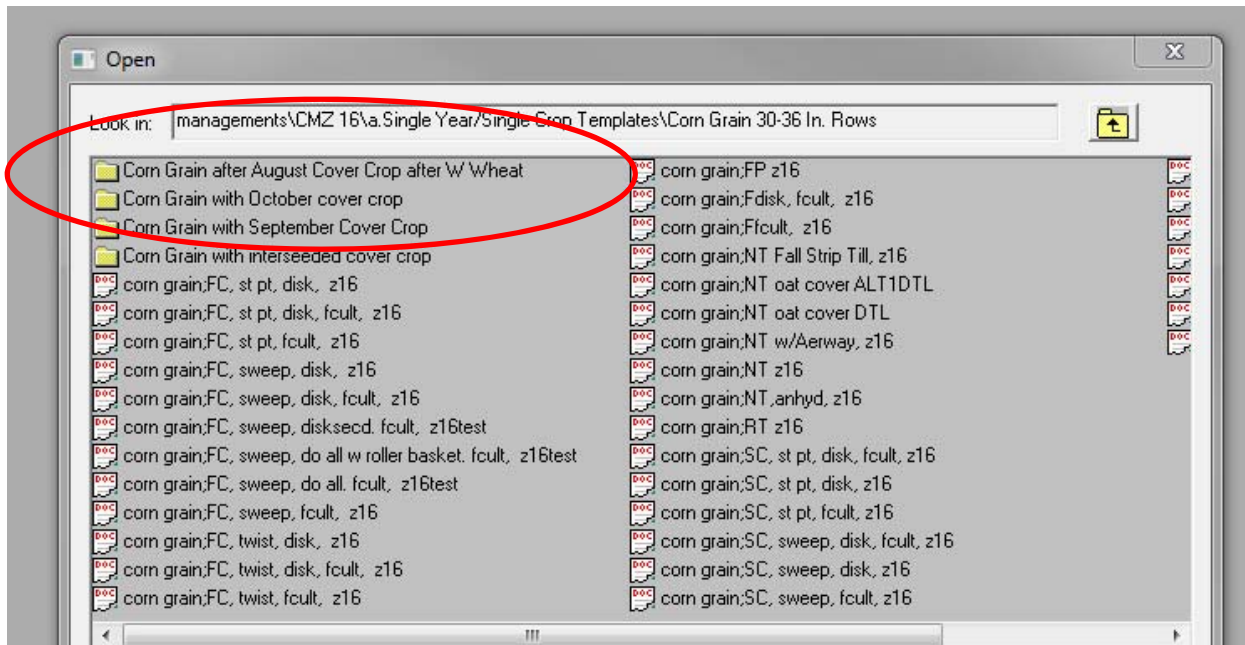
Residue for Cover Crops in RUSLE2

There have been numerous complaints that RUSLE2 soil loss predictions will increase when a no-till cover crop is added into the normal crop rotation. Logically, this should not be the case when cover crops are established according to the Cover Crop (340) conservation practice standard – more vegetative cover through the crop year should reduce erosion losses not increase erosion.

Within RUSLE2 cover crop options have been created for the following primary crops in Cover-Management Zones (CMZ) 16 and 17:

- Corn Grain 30-36 Inch Rows
- Corn Grain Nar. Row <18 Inch Rows
- Corn silage
- Oats
- Soybean Drilled (CMZ16 only)
- Soybean Nar. Row (CMZ17 only)
- Soybean Split Row
- Soybean Wide Row

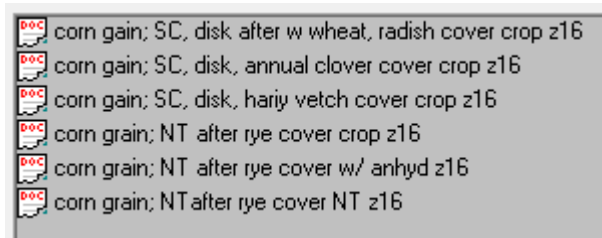
An example using “Corn Grain 30-36 Inch Rows” of the file folders that are available for each crop listed above are:



The four options for cover crops in rotation are:

1) Corn Grain after August Cover Crop after W Wheat

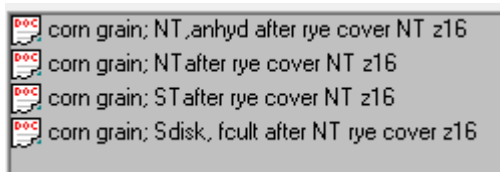
Choices in this management folder are:



The selections under this management folder listed above can only be used when corn grain is the next planned crop after a winter annual or spring annual crop (winter wheat, vegetables, buckwheat, oats, etc.) has been harvested and a significant portion of the summer and fall growing season remains for cover crop growth with planting occurring in mid-August. A summer cover crop of radishes, vetch, clover, or small grains may be planted and managed until frost occurs.

2) Corn Grain with October cover crop

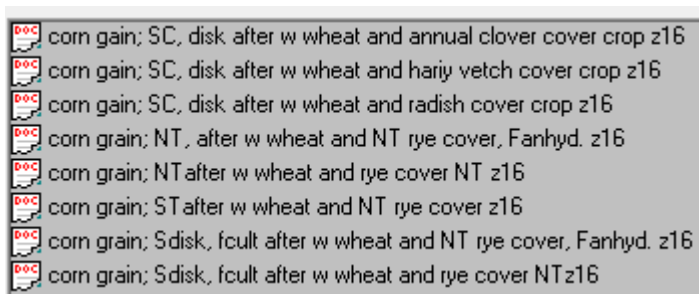
Choices in this management folder are:



The selections in this management folder listed above are cover crops that are established in the fall after the harvest of a full season crop like soybeans, melons, sorghum, sunflowers, and late sweet corn. The cover crop is planted in mid to late October and is allowed to grow into the spring green-up period before termination and the planting of corn grain as the primary crop.

3) Corn Grain with September Cover Crop

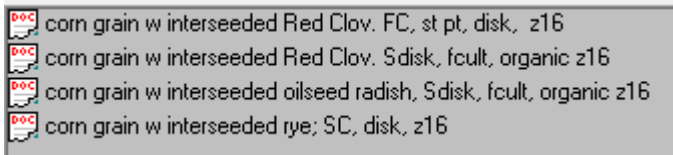
Choices in this management folder are:



The selections in this management folder listed above are cover crop options that are established in mid-September following crops such as winter wheat, corn silage, tomatoes, green snap beans, cucumbers, and sweet corn. The cover crop is established late in the growing season with only a few weeks before a killing frost.

4) Corn Grain with interseeded cover crop

Choices in this management file are:



The selections in the management folder listed above are to be used when the cover crop is seeded with the primary crop or shortly after the primary crop has been planted. The selected cover crop must be shade tolerant to survive in the understory of the primary crop in this case corn grain and must be winter hardy to survive the winter temperatures. When the primary crop is harvested, the cover crop is released to grow at the end of the growing season and through the winter months.

Evaluating Cover Crops in RUSLE2

When a management file for cover crops is selected, choose a file that is closest to the desired crop rotation. Any file may be modified to fit the desired rotation but there are less items to change if the selected file is somewhat similar to the actual situation. The planner may change dates, vegetation, operations, and yields to better model the rotation that has been used or will be used.

In most cases where soil erosion increased after adding a cover crop, the cover crop files have been used without making a yield adjustment for the growth stage of the cover crop and corresponding residue values. This may be the correct way to use the model particularly if the cover crop is planted late or terminated early with little vegetation growth on the soil surface but may not work well for cover crops that reach maturity. In the Tables that follow, select the growth time based on when most of the cover crop has emerged until the cover crop is terminated either by frost or man's activities.

When a cover crop is planted early and allowed adequate growth time, significant vegetative cover and root growth will result. The yield level in RUSLE2 can be entered to represent actual cover conditions that have developed. Conservation planners need to evaluate the cropping system and the average dates when land treatments (tillage, planting, and termination of cover) will be applied and estimate the ground cover that will result.

Attached are residue value tables for close-grown cover crops common in Missouri. Select the correct table for the planting season. From the table select the correct cover crop species or similar and the growth period to estimate residue to be used in RUSLE2. If a cover crop is planted and grown for a time period equal to or less than 60 days (to killing frost or termination), credit no more than 1000 lbs./acre of surface residue to the RUSLE2 soil loss calculations. When the cover crop is planted in the middle furrow of a cotton field, the RUSLE2 cover residue allowed will be one-half (50%) of the values listed in these tables.

**Table 1: Residue Values for Fall Planted Cover Crops
Pounds per Acre (lbs./acre)^{1/}**

Fall Planted Cover Crop Species	Min. 3 Months Growth-planted after Nov. 1	More than 4 Months Growth	More than 5 Months Growth	More than 6 Months Growth	More than 7 Months Growth
Cereal Rye	1500	2000	4000	5200	6500
Cereal Rye and Hairy Vetch	1000 ^{2/}	1500	3500	4700	6000
Cereal Rye and Crimson Clover	1000 ^{2/}	1400	3200	4400	5600
Winter Wheat	1200	1600	3200	4000	4800
Winter Wheat and Hairy Vetch	900 ^{2/}	1200	3000	4200	5500
Winter Wheat and Crimson Clover	900 ^{2/}	1200	2800	3600	4500
Annual Ryegrass	1000	1500	3300	3900	4500

Table 2: Residue Values for Summer Planted Cover Crops following a Spring Crop or Winter Wheat – Pounds per Acre (lbs./acre)^{1/}

Cover Crop Species	Minimum 3 Months Growth - Planted after July 1	4 Months Growth planted after spring crop	5 Months Growth released after wheat harvest	6 Months Growth released after wheat harvest
Buckwheat	2000	2000	-	-
Radishes, Kale, Collards, Turnips, Mustard, Rape	3000	4000	4500	5000
Oat, Rye, Barley, Wheat, Triticale	3000	4000	4500	5000
Pea, Vetch, Bean, Lentil, Soybean	2500	3700	4000	4400
Cereal Grains with Legumes	3500	4500	5000	5500
Sorghum or Sudangrass	2000	4500	6000	6500
Diverse Cover Crop Mix (4 or more species)	3200	4200	4700	5400
Simple Cover Crop Mix (2-3 species)	3000	4000	4500	5000

Table 3: Residue Values for Spring Planted Cover Crops before a Summer Crop – Pounds per Acre (lbs./acre)^{1/}

Cover Crop Species	Minimum 2 Months Growth—Planted after April 1	3 Months Growth – Planted after March 1	4 Months Growth – Planted after March 1
Buckwheat	1200	2000	-
Radishes, Kale, Collards, Turnips, Mustard, Rape	2000	3000	3500
Oat, Rye, Barley, Wheat, Triticale	2000	3000	3500
Pea, Vetch, Bean, Lentil, Soybean	2000	3000	3300
Cereal Grains with Legumes	2200	3200	3800
Cover Crop Mixes	2000	3000	3600

Footnotes: ^{1/} **The Residue Values displayed in Tables 1, 2, and 3 are for narrow row planting equipment - 15-inch or less spacing between rows for all cover crop species. If cover crop species re planted at a wider spacing in excess of 15 inches between rows, residue values in these tables will be reduced by 50 percent in RUSLE2 calculations.** ^{2/} **Hairy vetch and crimson clover will not survive the winter if planted after September 15 in northern Missouri and October 15 in southern Missouri.**