

## 5.4 CROPS

When crops are harvested, economic yield in the form of grain, seed, or lint are removed from the field. The stubble, stalks, or residue remaining after harvest may be standing or flat on the soil surface. Coefficients have been developed to describe residue levels and decomposition rates for flat and standing residues of specific crops (APPENDIX B-1). There are also coefficients to describe crop canopy development as a function of time (APPENDIX B-2).

### 5.4.1 Residue crop

The present decomposition data set includes 10 crops. Additional research is underway to expand this database. The residues in a field are portioned into standing or flat with the decomposition routines.

The yield intercept ( $y_a$ ) and yield slope ( $y_b$ ) are very important values because the biomass value is used in computing ground cover. To illustrate one method of determining  $y_a$  and  $y_b$ , biomass and yield data for sunflowers were supplied by Dr. Lorenz Sutherland. The data were collected by Klein, Thraillkill, and Golus in 1994-1996 at North Platte, NE. Data from hail damaged sunflowers were not included. These data plus additional data from Colorado and Kansas are illustrated in Figure 5.4.1. From these 47 data points,  $y_a = 228$  lb/acre when the yield is zero and  $y_b = 2.77$  pounds of biomass per pound of yield with an  $r^2 = 0.64$ . These values compare to  $y_a = 0$  and  $y_b = 3.60$  CORE values (APPENDIX B-1). This is one example of a technique to determine  $y_a$  and  $y_b$  values for crops not listed with the CORE crops.

Another method is to estimate plant characteristics when yield is zero. Farmers know plant populations (estimates of the number of stems), plant height, and stem diameter data. Estimates for ten crops are in Table 5.4.1. These data are used to compute maximum ground cover (assuming no overlap of flat residues) and then, based on mass-to-cover conversion factor, compute biomass. This provides estimates of potential ground cover with zero yield.

Figure 5.4.1. Example of computing  $y_a$  and  $y_b$  coefficients for sunflowers.

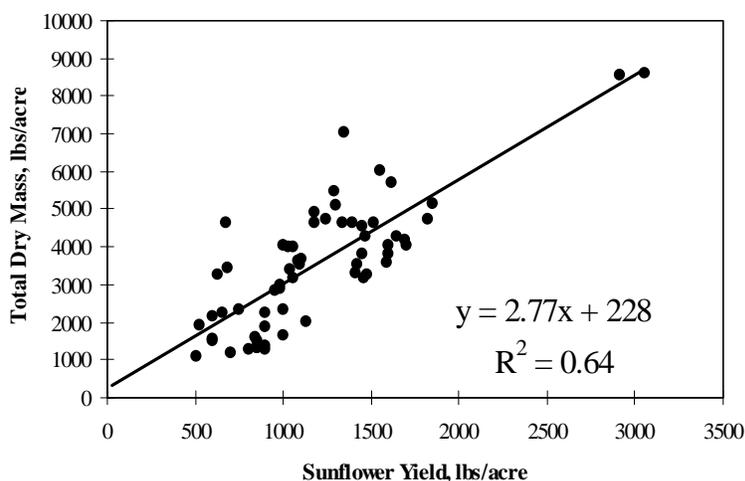


Table 5.4.1. Computing yield intercept ( $y_a$ ) from estimates of plant number, height, and diameter when yield is zero.

Crop <i>filename</i>	----Seeding Rate----		Population *	Plant Ht.	Plant Dia.	Plant Area**	Ground Cover	$y_a$
	<i>lb/ac</i>	<i>seeds/lb</i>	<i>plants/ac</i>	-----inches-----		<i>ft<sup>2</sup>/ac</i>	<i>%</i>	<i>lb/ac</i>
Cotton	20	2200	30800	20	0.3	2500	5.7	235
W_Wheat	60	17000	714000	12	0.2	11900	27.3	483
Corn	10	1200	8400	40	0.7	1633	3.7	88
Sunflowers	6	6000	25200	40	0.5	3500	8.0	288
Soybeans	90	2500	157500	20	0.3	13125	30.1	543
Oats	60	14000	588000	15	0.2	12250	28.1	347
S_Barley	80	13000	728000	15	0.2	15167	34.8	648
W_Barley	80	13000	728000	15	0.2	15167	34.8	648
Sorghum	5	20000	70000	24	0.7	8167	18.7	518
S_Wheat	90	17000	1071000	15	0.2	22312	51.2	1087

\* Based on 70% survival.

\*\* The height of the crop is multiplied by the diameter of the stem to give a plant area (in<sup>2</sup>). Multiplying the plant area by the number of plants per acre and dividing by 144 in<sup>2</sup>/ft<sup>2</sup> gives the plant area in ft<sup>2</sup>/acre. Dividing by 43560 ft<sup>2</sup>/acre gives the fraction of ground covered with plant material. The entire stem is assumed to be flat on the ground and not overlapping any other stems.

**5.4.1.1 Developing and saving a residue file:** Presently RWEQ has data for ten residue crops. Research is being conducted on additional crops, but until these data are available the RWEQ user must develop a file for a new crop based on knowledge of similar crops.

A file of residue data for a crop not in the choice list must be developed in DOS. For illustration purposes, the creation of a residue crop data file for kenaf follows. Kenaf is a fiber crop in the same family as cotton. The growth rate of kenaf is equivalent to or better than corn or sorghum. Plant cover (canopy) estimates are assumed to be the same as sorghum.

Residue crop data files are designated with “R\_” (e.g. R\_kenaf). At the C:\RWEQ97> prompt type **EDIT R\_KENAF**. For the kenaf residue crop data file use the following values. The data file must have one value (bolded below) on each line. The *filename* identifies the data. The file itself contains only one column of 11 numbers.

Yield intercept - <i>pounds/acre</i> (same as corn) (See APPENDIX B-1.)	<b>3000</b>
Yield slope - (same as corn)	<b>1.5</b>
Crop height - <i>feet</i> (assume dryland)	<b>6.0</b>
Stem diameter - <i>inches</i> (assume dryland)	<b>0.7</b>
After harvest height - <i>feet</i> (cut entire plant for fiber)	<b>0.3</b>
Standing mass loss coefficient - (assume same as cotton)	<b>0.0010</b>
Flat mass loss coefficient - (assume same as cotton)	<b>0.010</b>
Stem decline coefficient - (assume same as cotton)	<b>0.100</b>
Mass/cover conversion coefficient - <i>ha/kg</i> (assume same as cotton)	<b>-0.00025</b>
Takeoff factor - (assume same as corn)	<b>1.0</b>
Stem number threshold decomposition days - (assume same as cotton)	<b>45</b>

After all coefficients have been entered, **SAVE** the file and **EXIT** the editor.

Crop yield, % flat residue cover, and stem number are not part of the crop data file but are input by the operator in the RWEQ97 program as vegetation and residue information. If residue cover data are available, % cover may be entered if crop yield is left zero.

**5.4.1.2 Adding a residue crop to choice list:** To add a new residue crop filename to the RWEQ choice list you *must* exit the RWEQ program. At the C:\RWEQ97> prompt type **EDIT RWEQ.CLS**, page down to “\*crop”. At the end of this line press <enter>. Type the name of the new file (e.g. **R\_KENAF**). Select **SAVE** from the **FILE** menu. The new version of RWEQ.CLS is saved. Select **EXIT** from the **FILE** menu to exit the editor.

**5.4.1.3 Example of influence of flat residue decomposition on erosion estimates:**

Residues lying on the soil surface decompose under the influence of temperature and the number of times the residues are wet. These factors are in the weather files and are incorporated into RWEQ with the decomposition routine. To illustrate the impact of weather on residue decomposition the management file TEST.MAN is modified to create a new management file called TEST\_FR.MAN. (The FR denotes flat residue.) No crop is grown in TEST\_FR.MAN. Flat wheat residue is “weathered” for a year.

To modify TEST.MAN enter **TEST** for the Client filename and advance to the **DOABLE SCREEN** using the <enter> key.

- A. Under **Date Start** press <enter> to advance to **Vegetation**
  - B. Under **Vegetation** press F9 to enter the **Residue and Growing Crop** window.
- At the **Crop** prompt press F2 and use the arrow key if necessary to highlight *R\_WWheat*. (Figure 5.4.1.3.1.) Press <enter> to select.

Figure 5.4.1.3.1

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REVISIED WIND EROSION EQUATION
Client: TEST Weather File: W\TX23005.DAT
Man. File:TEST.MAN

Soil Residue and Growing Crop Information EF: 0.51 SCF: 0.6024
Residue
Yield: 0.0 lbs/a Crop: NONE Residue Crop over: 0.0 %
R_Corn
Stem Number: 0.0 R_Cotton 2
R_Grass
Crop Ht: 0.00 ft R_Oats 0.00 ft
R_SBarley 000000 0.00000
Growi R_SWheat
R_Sorghum
0.000 0.000 Crop: NO R_Soybean 0000 0.00
Growing C R_Sunflower
R_WBarley
R_WWheat
Press F1 Key Twice FUNCTION KEYS
Cursor keys scroll, <ENTER> selects and <ESC> exits choice menu
  
```

- At the **Yield** prompt type **1000** and press <enter>.
- At the **Flat Residue Cover** prompt press <enter> to accept the default value (0.0).
- At the **Stem Number** prompt press <enter> to accept the default value (0).
- At the **Crop Ht.** prompt press <enter> to accept the default value (2.00).
- At the **Harvest Ht.** prompt type **0** and press <enter>.

Entering a zero for the harvest height puts the residue flat on the surface, *i.e.* there is no standing residue after the crop is harvested.

- At the **Crop** prompt press <enter> to accept NONE.
- At the **Growing Crop** prompt (Figure 5.4.1.3.2) press <enter> to accept No.

Figure 5.4.1.3.2

```

REVISIED WIND EROSION EQUATION
Client: TEST Weather File: W\TX23005.DAT
Man. File:TEST.MAN

Soil Residue and Growing Crop Information EF: 0.51 SCF: 0.6024
Residue
Yield: 1000.0 lbs/ac Crop: R_WWheat Flat Residue Cover: 0.0 %
Stem Number: 0/1600 in2
Crop Ht: 2.00 ft Harvest Ht: 0.00 ft
Growing Crop
Crop: NONE
Growing Crop: No (y/n)
Press F1 Key Twice to View HELP on SPECIAL FUNCTION KEYS
Press F2 for choice list or <enter> to continue. DO NOT LEAVE BLANK.
  
```

- At the flashing **R\_WWheat** prompt press <enter> to advance to **Operation/Event**.
- C. Under **Operation/Event** press F9 to enter **Operation/Irrigation Data** window.
- At the **Operation** prompt press <enter> to accept NONE.

Under **Operation Modifies**

- At the **Roughness** prompt
- At the **Random Roughness** prompt
- At the **Ridge Spacing** prompt
- At the **Ridge Height** prompt
- At the **Ridge Direction** prompt
- At the **Kill Crop** prompt
- At the **% Flat Retained** prompt
- At the **% Retained Standing** prompt

- toggle No with the space bar and press <enter>.
- press <enter> to accept the default value (0.0).
- press <enter> to accept the default value (0.0).
- press <enter> to accept the default value (0.0).
- press <enter> to accept the default value (0.0).
- press <enter> to accept No.
- type **100** and press <enter> .
- press <enter> to accept the default value (0.0).

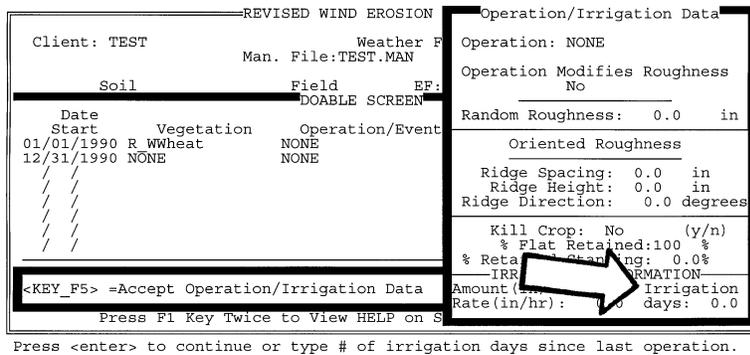
In this example the NONE for **Operation** and No for **Modifies Roughness** is correct; the **% Flat Retained** must be 100 to keep the program from burying a portion of the flat residue.

For irrigation information

- At the **Amount (in)** prompt
- At the **Rate (in/hr)** prompt
- At the **Irrigation days** prompt

- press <enter> to accept the default value (0.0).
- press <enter> to accept the default value (0.0).
- (Figure 5.4.1.3.3) press <enter> to accept the default value (0.0).

Figure 5.4.1.3.3



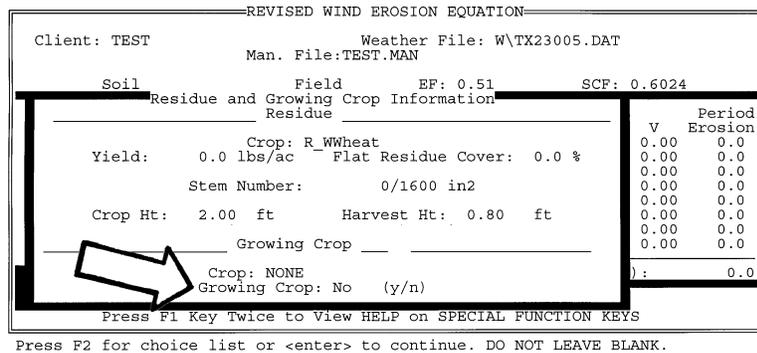
- D. At the flashing **NONE**
- E. At the flashing **No** under **Barrier**

- press <enter> to advance to **Barrier**.
- press <enter> which finishes the modifications of the first line in the **DOABLE SCREEN**.

For the second line in the **DOABLE SCREEN**

- F. Under **Date Start** press <enter> to advance to **Vegetation**.
  - G. Under **Vegetation** press F9 to enter the **Residue and Growing Crop Information** window.
- At the **Crop** prompt press F2, use the arrow key if necessary to highlight *R\_WWheat*, and press <enter> to select.
- At the **Yield** prompt press <enter> to accept the default value (0.0).
- At the **Flat Residue Cover** prompt press <enter> to accept the default value (0.0).
- At the **Stem Number** prompt press <enter> to accept the default value (0).
- At the **Crop Ht.** prompt press <enter> to accept the default value (2.00).
- At the **Harvest Ht.** prompt press <enter> to accept the default value (0.80).
- At the **Crop** prompt press <enter> to accept NONE.
- At the **Growing Crop** prompt (Figure 5.4.1.3.4) press <enter> to accept No.
- At the flashing **R\_WWheat** press <enter> to advance to **Operation/Event**.

Figure 5.4.1.3.4



- H. At the flashing **NONE** press <enter> to advance to **Barrier**.
- I. From the flashing **No** under **Barrier** press <enter> which finishes the modification of the second line in the **DOABLE SCREEN**.
- J. To estimate erosion press F10 and press <enter> to select *Compute Erosion*. When prompted, press <Esc> to show estimated erosion in the **DOABLE SCREEN**. Note in Figure 5.4.1.3.5 the 2.7 /ac total erosion.

Figure 5.4.1.3.5

REVISED WIND EROSION EQUATION

Client: TEST Weather File: W\TX23005.DAT  
 Man. File: TEST.MAN

Soil: DOABLE SCREEN Field: EF: 0.51 SCF: 0.6024

Date Start	Vegetation	Operation/Event	Barrier	K'	K''	V	Period Erosion
01/01/1990	R_Wheat	NONE	No	1.00	1.00	1.00	2.7
12/31/1990	R_Wheat	NONE	No	0.00	0.00	0.00	0.0
/ /			No	0.00	0.00	0.00	0.0
/ /			No	0.00	0.00	0.00	0.0
/ /			No	0.00	0.00	0.00	0.0
/ /			No	0.00	0.00	0.00	0.0
/ /			No	0.00	0.00	0.00	0.0
/ /			No	0.00	0.00	0.00	0.0
Total Erosion (t/ac):							2.7

RWEQ 97

Press F1 Key Twice to View HELP on SPECIAL FUNCTION KEYS

Press F9 for Crop Information window or <enter> to continue.

To view the tabular output

press F10, use the arrow key to highlight *Tabular Output*, and press <enter>. There are 26 15-day periods in the Tabular Output. Use the up and down arrows to scroll through the entire set of output. To move to the right use the <enter> key. See Figure 5.4.1.3.6. Press <Esc> twice to return to the **DOABLE SCREEN**.

Figure 5.4.1.3.6 This figure is a combination of several screens.

REVISED WIND EROSION EQUATION

Run Menu Erosion Computation Summary

Pd	Start Date	Days	E t/ac	CSL t/ac	Qmax lbs/ft	S ft	WF	K'	K''	V	S*
1	01/01/1990	15	0.00	0.0	1.0	0	35.3	1.000	1.000	0.034	1.0
2	01/16/1990	15	0.00	0.0	1.0	0	35.3	1.000	1.000	0.034	1.0
3	01/31/1990	15	0.00	0.1	2.4	0	62.2	1.000	1.000	0.034	1.0
4	02/15/1990	15	0.00	0.1	2.4	0	62.2	1.000	1.000	0.034	1.0
5	03/02/1990	15	0.48	0.2	5.0	921	96.4	1.000	1.000	0.034	1.0
6	03/17/1990	15	0.48	0.2	5.0	921	96.4	1.000	1.000	0.034	1.0
7	04/01/1990	15	0.35	0.1	3.8	985	79.0	1.000	1.000	0.034	1.0
8	04/16/1990	15	0.35	0.1	3.8	985	79.0	1.000	1.000	0.034	1.0
9	05/01/1990	15	0.25	0.1	4.3	986	53.4	1.000	1.000	0.034	1.0
10	05/16/1990	15	0.25	0.1	4.3	986	53.4	1.000	1.000	0.034	1.0
11	05/31/1990	15	0.19	0.2	4.6	968	42.0	1.000	1.000	0.034	1.0
12	06/15/1990	15	0.19	0.2	4.6	968	42.0	1.000	1.000	0.034	1.0
13	06/30/1990	15	0.00	0.0	0.8	0	13.5	1.000	1.000	0.036	1.0
14	07/15/1990	15	0.00	0.0	0.8	0	13.5	1.000	1.000	0.037	1.0
15	07/30/1990	15	0.00	0.0	0.3	0	9.3	1.000	1.000	0.039	1.0
16	08/14/1990	15	0.00	0.0	0.3	0	9.3	1.000	1.000	0.041	1.0
17	08/29/1990	15	0.00	0.0	0.8	0	14.2	1.000	1.000	0.044	1.0
18	09/13/1990	15	0.00	0.0	0.8	0	14.2	1.000	1.000	0.046	1.0
19	09/28/1990	15	0.00	0.1	2.9	0	27.7	1.000	1.000	0.048	1.0
20	10/13/1990	15	0.17	0.1	3.1	1067	27.7	1.000	1.000	0.049	1.0
21	10/28/1990	15	0.00	0.1	2.1	0	30.9	1.000	1.000	0.050	1.0
22	11/12/1990	15	0.00	0.1	2.1	0	30.9	1.000	1.000	0.050	1.0
23	11/27/1990	15	0.00	0.1	1.3	0	27.8	1.000	1.000	0.051	1.0
24	12/12/1990	15	0.00	0.1	1.3	0	27.8	1.000	1.000	0.051	1.0
25	12/27/1990	4	0.00	0.0	0.2	0	7.4	1.000	1.000	0.051	1.0
26	12/31/1990	0	0.00	0.0	0.0	0	0.0	0.000	0.000	0.000	0.0

Total Erosion (t/ac): 2.7

KEY\_ESC= Exit Period Info Display

Press F1 Key Twice to View HELP on SPECIAL FUNCTION KEYS

Use arrows, <tab>, or <enter> keys to move through screen.



At the **Flat Residue**

**Cover** prompt

At the **Stem Number**

prompt

At the **Crop Ht.** prompt

At the **Harvest Ht.** prompt

At the **Crop** prompt

At the **Growing Crop** prompt

N.

To estimate erosion

press <enter> to accept the default value (0.0).

press <enter> to accept the default value (0).

press <enter> to accept the default value (2.00).

type **0** and press <enter>. Since the default value was recalled it is necessary to re-enter the zero.

press <enter> to accept NONE.

press <enter> to accept No.

press F10 and press <enter> to select *Compute Erosion*. When prompted, press <Esc> to show estimated erosion in the **DOABLE SCREEN**.

Compare the estimated erosion (0.0 t/ac) and tabular output in Figure 5.4.1.3.8 with the estimated erosion (2.7 t/ac) and tabular output in Figure 5.4.1.3.6.

Figure 5.4.1.3.8 Several screens have been combined for this figure.

Pd	Start Date	Days	E t/ac	CSL t/ac	Qmax lbs/ft	S ft	WF	K'	K''	V	S*
1	01/01/1990	15	0.00	0.0	0.4	0	35.3	1.000	1.000	0.019	1.000
2	01/16/1990	15	0.00	0.0	0.4	0	35.3	1.000	1.000	0.019	1.000
3	01/31/1990	15	0.00	0.0	1.1	0	62.2	1.000	1.000	0.019	1.000
4	02/15/1990	15	0.00	0.0	1.1	0	62.2	1.000	1.000	0.019	1.000
5	03/02/1990	15	0.00	0.1	1.9	0	96.4	1.000	1.000	0.019	1.000
6	03/17/1990	15	0.00	0.1	1.9	0	96.4	1.000	1.000	0.019	1.000
7	04/01/1990	15	0.00	0.1	1.4	0	79.0	1.000	1.000	0.019	1.000
8	04/16/1990	15	0.00	0.1	1.4	0	79.0	1.000	1.000	0.019	1.000
9	05/01/1990	15	0.00	0.1	1.7	0	53.4	1.000	1.000	0.019	1.000
10	05/16/1990	15	0.00	0.1	1.7	0	53.4	1.000	1.000	0.019	1.000
11	05/31/1990	15	0.00	0.1	1.8	0	42.0	1.000	1.000	0.019	1.000
12	06/15/1990	15	0.00	0.1	1.8	0	42.0	1.000	1.000	0.019	1.000
13	06/30/1990	15	0.00	0.0	0.3	0	13.5	1.000	1.000	0.019	1.000
14	07/15/1990	15	0.00	0.0	0.3	0	13.5	1.000	1.000	0.020	1.000
15	07/30/1990	15	0.00	0.0	0.1	0	9.3	1.000	1.000	0.021	1.000
16	08/14/1990	15	0.00	0.0	0.1	0	9.3	1.000	1.000	0.022	1.000
17	08/29/1990	15	0.00	0.0	0.2	0	14.2	1.000	1.000	0.023	1.000
18	09/13/1990	15	0.00	0.0	0.3	0	14.2	1.000	1.000	0.024	1.000
19	09/28/1990	15	0.00	0.0	1.0	0	27.7	1.000	1.000	0.024	1.000
20	10/13/1990	15	0.00	0.0	1.0	0	27.7	1.000	1.000	0.025	1.000
21	10/28/1990	15	0.00	0.0	0.7	0	30.9	1.000	1.000	0.025	1.000
22	11/12/1990	15	0.00	0.0	0.7	0	30.9	1.000	1.000	0.025	1.000
23	11/27/1990	15	0.00	0.0	0.5	0	27.8	1.000	1.000	0.025	1.000
24	12/12/1990	15	0.00	0.0	0.5	0	27.8	1.000	1.000	0.025	1.000
25	12/27/1990	4	0.00	0.0	0.1	0	7.4	1.000	1.000	0.026	1.000
26	12/31/1990	0	0.00	0.0	0.0	0	0.0	0.000	0.000	0.000	0.000

KEY\_ESC= Exit Period Info Display      Total Erosion (t/ac): 0.0

Press F1 Key Twice to View HELP on SPECIAL FUNCTION

Use arrows, <tab>, or <enter> keys to move through screen.

Another way to see the influence of residue decomposition is to calculate erosion using the weather file from Kahului, HI (HI22516.DAT) and TEST\_FR.MAN. Compare the erosion estimate (0.0 t/ac) using 2000 #/ac wheat yield and Texas weather with the erosion estimate (11.2 t/ac in Figure 5.4.1.3.9) using the same wheat yield but Hawaii weather.

Figure 5.4.1.3.9

Run Menu		REVISED WIND EROSION EQUATION									
		Erosion Computation					Summary				
Pd	Start Date	Days	E t/ac	CSL t/ac	Qmax lbs/ft	S ft	WF	K'	K''	V	S*
1	01/01/1990	15	0.00	0.0	0.2	0	13.3	1.000	1.000	0.019	1.000
2	01/16/1990	15	0.00	0.0	0.2	0	13.3	1.000	1.000	0.019	1.000
3	01/31/1990	15	0.00	0.0	0.1	0	9.6	1.000	1.000	0.019	1.000
4	02/15/1990	15	0.00	0.0	0.1	0	9.6	1.000	1.000	0.020	1.000
5	03/02/1990	15	0.00	0.0	0.7	0	21.8	1.000	1.000	0.022	1.000
6	03/17/1990	15	0.00	0.0	0.8	0	21.8	1.000	1.000	0.024	1.000
7	04/01/1990	15	0.13	0.1	2.8	1052	41.6	1.000	1.000	0.026	1.000
8	04/16/1990	15	0.15	0.1	3.3	1016	41.6	1.000	1.000	0.028	1.000
9	05/01/1990	15	0.36	0.3	8.0	826	66.6	1.000	1.000	0.031	1.000
10	05/16/1990	15	0.41	0.3	9.3	796	66.6	1.000	1.000	0.034	1.000
11	05/31/1990	15	0.86	0.7	18.9	669	100.2	1.000	1.000	0.037	1.000
12	06/15/1990	15	0.96	0.8	21.2	650	100.2	1.000	1.000	0.040	1.000
13	06/30/1990	15	1.07	0.9	23.7	633	98.2	1.000	1.000	0.044	1.000
14	07/15/1990	15	1.23	0.6	27.2	610	98.2	1.000	1.000	0.048	1.000
15	07/30/1990	15	1.08	0.9	24.4	628	81.4	1.000	1.000	0.053	1.000
16	08/14/1990	15	1.24	0.6	28.0	606	81.4	1.000	1.000	0.058	1.000
17	08/29/1990	15	0.88	0.7	20.1	660	59.0	1.000	1.000	0.064	1.000
18	09/13/1990	15	1.00	0.8	22.7	640	59.0	1.000	1.000	0.069	1.000
19	09/28/1990	15	0.60	0.5	13.1	733	38.8	1.000	1.000	0.076	1.000
20	10/13/1990	15	0.69	0.6	15.2	707	38.8	1.000	1.000	0.084	1.000
21	10/28/1990	15	0.18	0.1	4.0	972	15.4	1.000	1.000	0.093	1.000
22	11/12/1990	15	0.22	0.2	4.7	936	15.4	1.000	1.000	0.103	1.000
23	11/27/1990	15	0.00	0.1	2.4	0	10.9	1.000	1.000	0.112	1.000
24	12/12/1990	15	0.15	0.1	2.8	1058	10.9	1.000	1.000	0.122	1.000
25	12/27/1990	4	0.00	0.0	0.3	0	2.9	1.000	1.000	0.125	1.000
26	12/31/1990	0	0.00	0.0	0.0	0	0.0	0.000	0.000	0.000	0.000

KEY\_ESC= Exit Period Info Display

Press F1 Key Twice to View HELP on SPECIAL FUNCTION

Use arrows, <tab>, or <enter> keys to move through screen.

Total Erosion (t/ac): 11.2

For a summary of the influence of weather and residue amounts on residue decomposition see the differences in erosion in Table 5.4.1.3. All other parameters (*i.e.* soil, field, management) were the same.

Table 5.4.1.3 Erosion estimates based on residue from two different wheat yields in the TEST\_FR.MAN file.

Weather filename	1000 lbs/ac	2000 lbs/ac
	-----t/ac-----	
TX23005.DAT	2.7	0.0
HI22516.DAT	31.8	11.2

#### 5.4.1.4 Example of influence of standing residue decomposition for on erosion estimates:

The following example illustrates the decay of standing residues for the same yield. TEST\_FR.MAN is modified to show standing instead of flat residue.

To modify TEST\_FR.MAN advance to the **DOABLE SCREEN** using the <enter> key.

- |    |   |   |
|----|---|---|
| A. | Under <b>Date Start</b>                 | press <enter> to advance to <b>Vegetation</b> .   |
| B. | Under <b>Vegetation</b>                 | press F9 to enter the <b>Residue and Growing Crops Information</b> window.                        |
|    | At the <b>Crop</b> prompt               | press F2, use the arrow key if necessary to select <i>R_WWheat</i> , and press <enter> to select. |
|    | At the <b>Yield</b> prompt              | press <enter> to accept 1000.   |
|    | At the <b>Flat Residue Cover</b> prompt | press <enter> to accept the default value (0.0).  |
|    | At the <b>Stem Number</b> prompt        | type <b>200</b> and press <enter>.  |
|    | At the <b>Crop Ht.</b> prompt           | press <enter> to accept the default value (2.00).   |
|    | At the <b>Harvest Ht.</b> prompt        | type <b>2</b> and press <enter>.  |
|    | At the <b>Crop</b> prompt               | press <enter> to accept NONE.   |
|    | At the <b>Growing Crop</b> prompt       | (Figure 5.4.1.4.1) press <enter> to accept No.  |
|    | At the flashing <b>R_WWheat</b>         | press <enter> to advance to <b>Operation/Event</b> .  |

Figure 5.4.1.4.1

```

-----REVISED WIND EROSION EQUATION-----
Client: TEST_FR           Weather File: W\TX23005.DAT
Man. File:TEST_FR.MAN

Soil      Field      EF: 0.51      SCF: 0.6024
Residue and Growing Crop Information
Residue
Crop: R WWheat
Yield: 1000.0 lbs/ac  Flat Residue Cover: 0.0 %
Stem Number:      200/1600 in2
Ht: 2.00 ft      Harvest Ht: 2.00 ft
Growing Crop
Crop: NONE
Growing Crop: No (y/n)

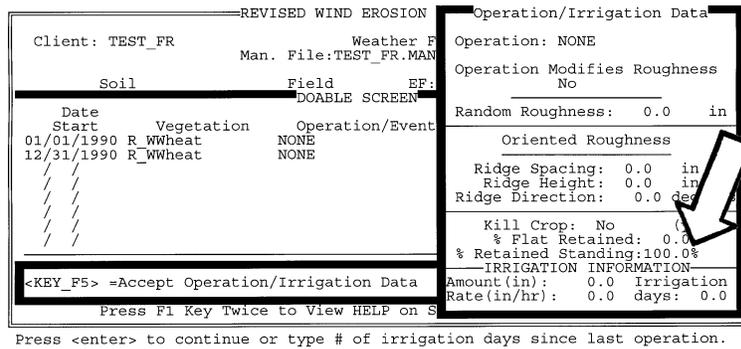
V      Period
Erosion
0.00  0.0
0.00  0.0
0.00  0.0
0.00  0.0
0.00  0.0
0.00  0.0
0.00  0.0
0.00  0.0
): 0.0

Press F1 Key Twice to View HELP on SPECIAL FUNCTION KEYS
Press F2 for choice list or <enter> to continue. DO NOT LEAVE BLANK.

```

- C. Under **Operation/Event** press F9 to enter **Operation/Irrigation data** window.
- At the **Operation** prompt press <enter> to accept NONE.
- Under **Operation Modifies Roughness** toggle No with the space bar and press <enter>.
- At the **Random Roughness** prompt press <enter> to accept the default value (0.0).
- At the **Ridge Spacing** prompt press <enter> to accept the default value (0.0).
- At the **Ridge Height** prompt press <enter> to accept the default value (0.0).
- At the **Ridge Direction** prompt press <enter> to accept the default value (0.0).
- At the **Kill Crop** prompt press <enter> to accept the default value (No).
- At the **% Flat Retained** prompt press <enter> to accept the default value (0.0).
- At the **% Retained Standing** prompt type **100** and press <enter> (Figure 5.4.1.4.2).
- For irrigation information
- At the **Amount (in)** prompt press <enter> to accept the default value (0.0).
- At the **Rate (in/hr)** prompt press <enter> to accept the default value (0.0).
- At the **Irrigation days** prompt press <enter> to accept the default value (0.0).

Figure 5.4.1.4.2



- D. From the flashing **NONE** press <enter> to advance to **Barrier**.
- E. From the flashing **No** under **Barrier** press <enter> which finishes the modification of the first line in the **DOABLE SCREEN**.
- For the second line in the **DOABLE SCREEN**
- E. Under **Date Start** press <enter> twice to advance to **Operation/Event**.
- F. Under **Operation/Event** press F9 to enter **Operation/irrigation data** window.  
At the **Operation** prompt press <enter> to accept NONE.  
Under **Operation Modifies Roughness** toggle No with the space bar and press <enter>.  
At the **Random Roughness** prompt press <enter> to accept the default value (0.0).  
At the **Ridge Spacing** prompt press <enter> to accept the default value (0.0).  
At the **Ridge Height** prompt press <enter> to accept the default value (0.0).  
At the **Ridge Direction** prompt press <enter> to accept the default value (0.0).  
At the **Kill Crop** prompt press <enter> to accept the default value (No).  
At the **% Flat Retained** prompt press <enter> to accept the default value (0.0).  
At the **% Retained Standing** prompt type **100** and press <enter>.
- For irrigation information  
At the **Amount (in)** prompt press <enter> to accept the default value (0.0).

- At the **Rate (in/hr)** prompt press <enter> to accept the default value (0.0).
- At the **Irrigation days** prompt press <enter> to accept the default value (0.0).
- G. From the flashing **NONE** press <enter> to advance to **Barrier**.
- H. From the flashing **No** under **Barrier** press <enter> which finishes the modification of the second line in the **DOABLE SCREEN**. press F10 and press <enter> to select *Compute Erosion*. When prompted, press <Esc> to show estimated erosion in the **DOABLE SCREEN**. Note in Figure 5.4.1.4.3 the 0.0 t/ac erosion.
- I. To estimate erosion

Figure 5.4.1.4.3

REVISED WIND EROSION EQUATION							
Client: TEST_FR		Weather File: W\TX23005.DAT		EF: 0.51		SCF: 0.6024	
Man. File:TEST_FR.MAN		DOABLE SCREEN					
Date	Vegetation	Operation/Event	Barrier	K'	K''	V	Period Erosion
01/01/1990	R_WWheat	NONE	No	1.00	1.00	0.00	0.0
12/31/1990	R_WWheat	NONE	No	1.00	1.00	0.10	0.0
/	/	/	No	0.00	0.00	0.00	0.0
/	/	/	No	0.00	0.00	0.00	0.0
/	/	/	No	0.00	0.00	0.00	0.0
/	/	/	No	0.00	0.00	0.00	0.0
/	/	/	No	0.00	0.00	0.00	0.0
Total Erosion (t/ac):							0.0

RWEQ 97

Press F1 Key Twice to View HELP on SPECIAL FUNCTION

Press F9 for Operation/Irrigation Data window or <enter> to continue.

- To view the tabular output press F10, use the arrow key to select *Tabular Output*, and press <enter>. There are 26 15-day periods in the Tabular Output. Use the up and down arrow keys to scroll through the entire set of output. To move to the right use the <enter> key. See Figure 5.4.1.4.4. Press <Esc> twice to return to the **DOABLE SCREEN**.

Figure 5.4.1.4.4. This figure is a combination of several screens.

Run Menu			REVISED WIND EROSION EQUATION				Erosion Computation Summary				
Pd	Start Date	Days	E t/ac	CSL t/ac	Qmax lbs/ft	S ft	WF	K'	K''	V	S*
1	01/01/1990	15	0.00	0.0		0	35.3	1.000	1.000	0.000	1.000
2	01/16/1990	15	0.00	0.0		0	35.3	1.000	1.000	0.000	1.000
3	01/31/1990	15	0.00	0.0		0	62.2	1.000	1.000	0.000	1.000
4	02/15/1990	15	0.00	0.0		0	62.2	1.000	1.000	0.000	1.000
5	03/02/1990	15	0.00	0.0		0	96.4	1.000	1.000	0.000	1.000
6	03/17/1990	15	0.00	0.0		0	96.4	1.000	1.000	0.000	1.000
7	04/01/1990	15	0.00	0.0		0	79.0	1.000	1.000	0.000	1.000
8	04/16/1990	15	0.00	0.0		0	79.0	1.000	1.000	0.000	1.000
9	05/01/1990	15	0.00	0.0		0	53.4	1.000	1.000	0.000	1.000
10	05/16/1990	15	0.00	0.0		0	53.4	1.000	1.000	0.000	1.000
11	05/31/1990	15	0.00	0.0		0	42.0	1.000	1.000	0.000	1.000
12	06/15/1990	15	0.00	0.0		0	42.0	1.000	1.000	0.000	1.000
13	06/30/1990	15	0.00	0.0		0	13.5	1.000	1.000	0.000	1.000
14	07/15/1990	15	0.00	0.0		0	13.5	1.000	1.000	0.000	1.000
15	07/30/1990	15	0.00	0.0	0.0	0	9.3	1.000	1.000	0.002	1.000
16	08/14/1990	15	0.00	0.0	0.0	0	9.3	1.000	1.000	0.004	1.000
17	08/29/1990	15	0.00	0.0	0.0	0	14.2	1.000	1.000	0.008	1.000
18	09/13/1990	15	0.00	0.0	0.1	0	14.2	1.000	1.000	0.013	1.000
19	09/28/1990	15	0.00	0.0	0.4	0	27.7	1.000	1.000	0.015	1.000
20	10/13/1990	15	0.00	0.0	0.5	0	27.7	1.000	1.000	0.017	1.000
21	10/28/1990	15	0.00	0.0	0.4	0	30.9	1.000	1.000	0.018	1.000
22	11/12/1990	15	0.00	0.0	0.4	0	30.9	1.000	1.000	0.018	1.000
23	11/27/1990	15	0.00	0.0	0.3	0	27.8	1.000	1.000	0.019	1.000
24	12/12/1990	15	0.00	0.0	0.3	0	27.8	1.000	1.000	0.019	1.000
25	12/27/1990	4	0.00	0.0	0.1	0	7.4	1.000	1.000	0.019	1.000
26	12/31/1990	0	0.00	0.0	0.0	0	0.0	0.000	0.000	0.000	0.000

KEY\_ESC= Exit Period Info Display      Total Erosion (t/ac): 0.0

Press F1 Key Twice to View HELP on SPECIAL FUNCTION KEYS

Use arrows, <tab>, or <enter> keys to move through screen.

J. To save the management file  
At the **Save Client**  
**File** prompt

press F6.

type **TEST\_SR** and press <enter>. This client filename (TEST\_SR) is automatically added to the choice list when it is saved.

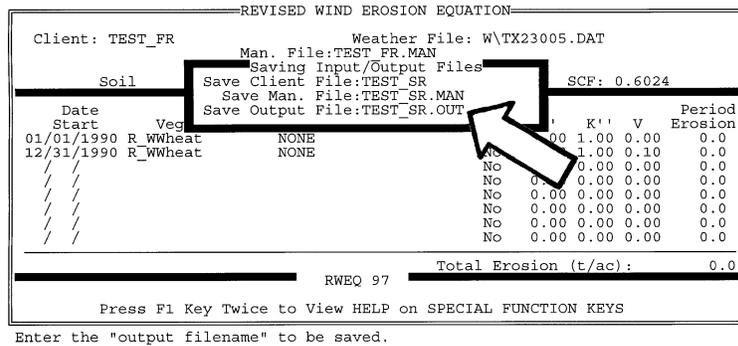
At the **Save Man. File**  
prompt

type **TEST\_SR.MAN** and press <enter>.

At the **Save Output**  
**File** prompt

type **TEST\_SR.OUT** (Figure 5.4.1.4.5) and press <enter>. Press <Esc> when prompted. The output file is the tabular output in Figure 5.4.1.4.4.

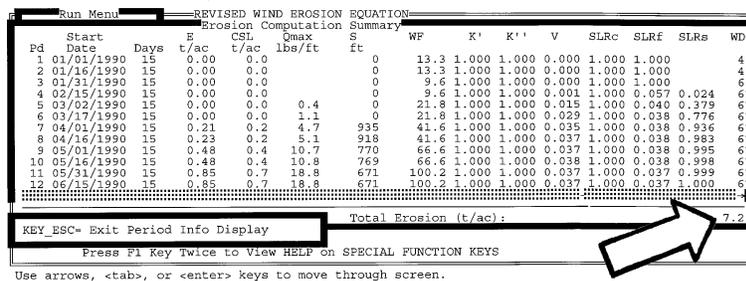
Figure 5.4.1.4.5



The modifications tell the program that there is no flat residue after the crop is harvested. The residues are all standing after harvest, *i.e.* the % retained standing is 100 in the Operation/Irrigation Data window.

RWEQ first decays the standing stubble until the standing stubble begins to fall. As it falls it becomes flat cover and the  $SLR_f$  values increase. The estimated erosion with Kahului, Hawaii weather (HI22516.DAT) and TEST\_SR.MAN is given in Figure 5.4.1.4.6.

Figure 5.4.1.4.6.



The climatic effects on standing residue decomposition are evident in comparing the tabular output for Spokane, Washington; Kahului, Maui, Hawaii; and Big Spring, Texas. The effect of rainfall and temperatures on decomposition of standing residues and on the time required for the standing residues to fall onto the soil surface are illustrated in the outputs from Big Spring, Texas (hot, dry climate), Spokane, Washington (cooler, drier climate), and Kahului, Maui, Hawaii (wet, tropical climate). As shown in Table 5.4.1.4, the Big Spring standing residues start falling on June 15, at Spokane, on July 15, and at Kahului on February 15. At Big Spring and Spokane

there were still stalks standing on December 30. At Kahului all of the standing stalks were flat on the ground by June 15. The decay of flat residues in the wet, tropical climate is vary rapid compared to dry, hot climates. The impact of termites is not included in these estimates of residue decays.

Table 5.4.1.4. Decay of standing wheat residue at Spokane, Washington; Big Spring, Texas; and Kahului, Hawaii.

period	start date	WA24157.DAT		TX23005.DAT		HI22516.DAT	
		SLR <sub>f</sub>	SLR <sub>s</sub>	SLR <sub>f</sub>	SLR <sub>s</sub>	SLR <sub>f</sub>	SLR <sub>s</sub>
1	01/01/1990	1.00	0.00	1.00	0.00	1.00	0.00
2	01/16/1990	1.00	0.00	1.00	0.00	1.00	0.00
3	01/31/1990	1.00	0.00	1.00	0.00	1.00	0.00
4	02/15/1990	1.00	0.00	1.00	0.00	0.06	0.02
5	03/02/1990	1.00	0.00	1.00	0.00	0.04	0.38
6	03/17/1990	1.00	0.00	1.00	0.00	0.04	0.78
7	04/01/1990	1.00	0.00	1.00	0.00	0.04	0.94
8	04/16/1990	1.00	0.00	1.00	0.00	0.04	0.98
9	05/01/1990	1.00	0.00	1.00	0.00	0.04	0.99
10	05/16/1990	1.00	0.00	1.00	0.00	0.04	1.00
11	05/31/1990	1.00	0.00	1.00	0.00	0.04	1.00
12	06/15/1990	1.00	0.00	1.00	0.00	0.04	1.00
13	06/30/1990	1.00	0.00	0.14	0.00	0.04	1.00
14	07/15/1990	1.00	0.00	0.07	0.01	0.04	1.00
15	07/30/1990	0.23	0.00	0.05	0.04	0.04	1.00
16	08/14/1990	0.11	0.00	0.04	0.10	0.04	1.00
17	08/29/1990	0.07	0.01	0.04	0.21	0.04	1.00
18	09/13/1990	0.06	0.02	0.04	0.33	0.04	1.00
19	09/28/1990	0.05	0.03	0.04	0.40	0.04	1.00
20	10/13/1990	0.05	0.04	0.04	0.47	0.04	1.00
21	10/28/1990	0.05	0.05	0.04	0.49	0.04	1.00
22	11/12/1990	0.05	0.05	0.04	0.52	0.04	1.00
23	11/27/1990	0.04	0.06	0.04	0.53	0.04	1.00
24	12/12/1990	0.04	0.06	0.04	0.54	0.04	1.00
25	12/27/1990	0.04	0.06	0.03	0.55	0.03	1.00

### 5.4.2 Growing crop

Canopy data are available for the 6 crops in the RUSLE data files. These crop growth coefficients describe the relationship between canopy cover and plant age for 60 to 75 days after planting. The current crop growth parameters (APPENDIX B-2) are mathematical expressions of the canopy development data in RUSLE. Research is continuing to expand this core database. A best guess of equivalent values will have to be used for new crops. Growing crops also provide canopy cover after seeding. Crop canopy in RUSLE was converted to a Soil Loss Ratio for crop canopy ( $SLR_c$ ).

The crop growth model is not tied to the weather file; therefore RWEQ will grow any crop any where in the world. As data are available the plan is to tie the crop growth function to the weather file in subsequent versions of RWEQ. If similar data on canopy development as a function of days after planting are available, the equivalent coefficients can be developed using statistical relationships in Table Curve, Stat-Pac, or other analysis packages. If the same general equation form is used the coefficients can be compared. These coefficients in APPENDIX B-2 are for the first 75 days (60 for winter small grains) after planting, not the entire growth period.

**5.4.2.1 Developing a growing crop input file:** To create a growing crop input file for kenaf, at the C:\RWEQ97> prompt type **EDIT G\_KENAF**. Since the canopy development of kenaf is similar to sorghum, use the plant growth coefficients given for sorghum in APPENDIX B-2.

Plant growth coefficient “a”, pgca	<b>0.408</b>
Plant growth coefficient “b”, pgcb	<b>-2273.16</b>

There are only two numbers in a growing crop input file. Choose SAVE from the FILE menu. Select EXIT from the FILE menu to exit the editor.

**5.4.2.2 Adding a growing crop input file to the choice list:** To add a new growing crop filename to the RWEQ choice list you *must* exit the RWEQ program. Add a new growing crop input file to the choice list from DOS. At the C:\RWEQ97> prompt type **EDIT RWEQ.CLS**, page down to “\*gcrop”. At the end of this line press <enter>. Type the name of the new growing crop file (*e.g.* **G\_KENAF**). Select SAVE from the FILE. The new version of RWEQ.CLS is saved. Select EXIT from the FILE menu to exit the editor.