

5.8 IRRIGATION

In RWEQ irrigation impacts soil roughness decay and surface residue decomposition the same as an equivalent rain. *EI* is computed from irrigation amount and application rate. An irrigation initiates the soil crust factor development. RWEQ begins calculating the effect of an irrigation at the beginning of the erosion period in which the irrigation is described.

5.8.1 What is irrigation data

RWEQ uses the amount of irrigation water, the application rate, and the number of days that irrigation water was applied. Anytime irrigation information is supplied in the **Operation/Irrigation Data** window, the effects of that irrigation are calculated at the beginning of that erosion period. The soil wetness term is used to adjust the wind factor, and the number of irrigation days is used to decompose residues and decay soil roughness.

5.8.2 Source of irrigation data

The farmer is the source of irrigation data.

5.8.3 Developing an irrigation file

Based on historical records or personal knowledge, an irrigation plan is developed.

To show the effect of irrigation on erosion estimates the management file BST90.MAN is used with the weather file W\BST90.DAT from Big Spring, Texas (CLIENT filename = BST90). This management file is modified to be an extreme example with random roughness = 1.6, ridge spacing = 0, ridge height = 0, and ridge orientation = 0. Three irrigation scenarios are used. In the first example 15 inches of irrigation water are applied at the rate of 1 inch/hour over 15 days. The second case calls for 15 inches of irrigation water to be applied at the rate of 1 inch/hour in one day. The third case calls for 1 inch of irrigation water to be applied at the rate of 1 inch/hour over a period of 15 days. An example of where to make these changes is in Figure 5.8.3.

Figure 5.8.3

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      REVISED WIND EROSION
Client: BST90           Weather File: W\BST90.DAT
Man. File:BST90.MAN
-----
Soil      Field      EF:
DOABLE SCREEN
-----
Date      Start      Vegetation  Operation/Event
01/05/1990 R_Cotton  Plane
04/16/1990 R_Cotton  CHI_STR
05/04/1990 R_Cotton  NONE
//
//
//
//
//
//
-----
Operation/Irrigation Data
Operation: Plane
Operation Modifies Roughness
Yes
-----
Random Roughness:  1.6  in
-----
Oriented Roughness
Ridge Spacing:  0.0  in
Ridge Height:   0.0  in
Ridge Direction: 0.0 degrees
-----
Kill Crop: Yes (y/n)
% Flat Retained:100.0%
% Retained Standing:100.0%
-----
IRRIGATION INFORMATION
Amount(in):  15.0  Irrigation
Rate(in/hr):  1.0  days: 15.0
-----
<KEY_F5> =Accept Operation/Irr
Press F1 Key Twice to View HELP on S
Press <enter> to continue or type # of irrigation days since last operation.
  
```

Table 5.8.3.1 compares erosion estimates for the three examples with no irrigation water.

Table 5.8.3.1. Erosion estimates using BST90.MAN and BST90.W1 with different irrigation scenarios. The irrigation rate was the same for all (1 inch/hour).

Irrigation amount, <i>inches/</i> irrigation days, <i>number</i>	None	15/15	15/1	1/15
Erosion estimate, <i>t/ac</i>	5.7	0	40.1	4.1

Part of the benefits of wet soil from the irrigations are offset by a decay of soil roughness. Soil roughness on 02/04/1990 went from 0.088 with rainfall only to 0.57 with 15 inches of irrigation (Table 5.8.3.2).

Table 5.8.3.2. Random roughness (K') for each erosion period in the tabular output for a dryland system compared to three irrigation scenarios. All examples started with random roughness = 1.6, ridge spacing = 0, ridge height = 0, ridge orientation = 0 for the 01/05/1990 line of data.

period	start date	Irrigation amount, <i>inches/</i> irrigation days, <i>number</i>			
		None	15/15	15/01	01/15
1	01/05/1990	0.055	0.169	0.169	0.060
2	01/20/1990	0.064	0.356	0.356	0.077
3	02/04/1990	0.088	0.570	0.570	0.111
4	02/19/1990	0.117	0.737	0.737	0.152
5	03/06/1990	0.135	0.840	0.840	0.182
6	03/21/1990	0.154	0.905	0.905	0.215
7	04/05/1990	0.184	0.939	0.939	0.257
8	04/16/1990	0.126	0.126	0.126	0.126
9	04/20/1990	0.172	0.172	0.172	0.172

In Table 5.8.3.1 the effect of 15 inches of irrigation varies depending on whether the water is applied in one day (15/1) or 15 days (15/15). The difference in erosion is due to the reduction in WF, not changes in soil roughness (Table 5.8.3.2).