

2. RWEQ INPUT FILE DEVELOPMENT

Input files can be developed and/or modified within the RWEQ program. Guides for preparing a new file, saving the new file, and adding the file to the choice list are presented. These guides are not intended to explain all the routines in RWEQ but are intended to provide sufficient information to enable a computer novice to successfully utilize the capabilities of the RWEQ program.

2.1 CLIENT

The CLIENT in RWEQ is the name assigned to the two line file that contains the names of the management and weather files for a particular farm unit.

2.1.1 Existing client file

An existing client file can be recalled by typing the filename at the **CLIENT** prompt or by using the F2 key to call the choice list, using the arrow to select the file and pressing <enter>.

2.1.2 New client file

A new CLIENT file is developed in RWEQ from the weather and management input filenames. Use the RWEQ INPUT FORM (APPENDIX A-2) as a worksheet to assemble the necessary inputs.

To develop a new file, at the **CLIENT** prompt, type a new name for the CLIENT file and press <enter>, OR at the **CLIENT** prompt, simply press <enter> to leave the CLIENT filename blank and continue. Select a weather file from the F2 choice list or type a weather filename. Press <enter> to advance to the **Man. File** prompt. Select a management file from the F2 choice list or type an existing management filename. Press <enter> to advance through the **Soil Properties** and **Field Geometry** windows and to the **DOABLE SCREEN**.

For example to create a CLIENT file for a bare field at Big Spring, Texas, advance to the weather file prompt using the <enter> key. Type **WTX23005.DAT** for the weather data file for Big Spring and press <enter>. From **Man. File**: press F2 for the choice list, select **BSTBARE.MAN** using the arrow keys and press <enter> to continue. Press <enter> to advance through and accept default values in **Soil Properties** and **Field Geometry** windows.

2.1.3 Saving a new client file

From the DOABLE SCREEN, press F6 to enter the **Saving Input/Output File** window. To the right of **Save Client File**: enter the new CLIENT filename (*e.g.* **BSTBARE**). Press <enter>. RWEQ saves the weather filename (TX23005.DAT) and management file (BSTBARE.MAN) under the name assigned to the CLIENT file (BSTBARE).

2.1.4 Adding a client file to the choice list

RWEQ automatically adds the filename to the choice list (in alphabetical order if the first letter is capitalized) when the file is saved with the F6 key.

2.2 WEATHER

The present weather files contain monthly total or average values for all the weather parameters required by RWEQ. The weather files were assembled by using WERIS (Wind Energy Resource Information System) data bases and computing values for all parameters (Skidmore and Tatarko, 1990).

2.2.1 Existing file

If the desired weather file already exists, it may be called into the RWEQ program by typing the filename at the weather prompt. If the filename is in the choice list, at the weather prompt press F2, use the arrow key to highlight the filename, and press <enter> . (For example, W\TX23005.DAT brings in the Big Spring, Texas weather file.)

2.2.2 Modifying existing file

An existing weather file may be modified in the DOS editor. At the C:\RWEQ97> prompt, type **EDIT W\TX23005.DAT** to bring in the Big Spring, Texas file. Any of the data may be overwritten. The number of decimal places is not critical, but there must be at least one space between monthly data on same line. If for example, the RWEQ operator has rainfall data (or any weather data) for a site not included in these 602 sites, the weather file for an adjacent site may be modified file with new rainfall data.

2.2.3 Saving a new weather file

After making the necessary modifications, select SAVE AS from the FILE menu (press ALT, F, and A). Type the name of the new weather file (*e.g.* **W\TX_BIGSP.DAT**) and press <enter>. Select EXIT from the FILE menu to exit the editor (press ALT, F, and X).

2.2.4 Adding to the choice list

A new weather file may be added to the choice list from DOS. At the C:\RWEQ97> prompt type **EDIT RWEQ.CLS**. A portion of this file appears below. Find “*climate” in the listing. At the end of this line press <enter> to create a blank line below “climate”. Type the name of the new weather file on this blank line. The line immediately under “*climate” appears first in the F2 choice list. Select SAVE from the FILE menu to save the new version of RWEQ.CLS (press ALT, F, and S). Select EXIT from the FILE menu to exit the editor (press ALT, F, and X).

```
SWEEPS_2
SWEEPS_3
*climate
AC88.W1
AC89.W1
AC90.W1
BST90.W1
BST91.W1
```

2.3 MANAGEMENT

The management file includes soil properties, field geometry, crop, tillage, irrigation, and barrier data. A new management file may be developed using the RWEQ program or the DOS editor. Either method may be used to customize crops and tillage operations for a specific region.

As a management file is developed in RWEQ default values are called into the program for soil, residue and growing crops and tillage. These generic values may be overwritten to better describe a specific management system. Any new values (with the exception of soil erodible fraction, EF) are saved in the management file when the management file is saved.

When prompted for a management filename the choices are

- (1) to type the name of a previously developed and saved management file,
- (2) to press F2, highlight a previously developed and saved management file from the choice list, and press <enter> ,
- (3) to type the name of a new management file, or
- (4) to press <enter> twice to continue without a filename.

2.3.1 Developing and saving a new management file using RWEQ

The easiest way to develop a new management file is to use the RWEQ program. From **Man. File:** type a new management filename and press <enter> or just press <enter> to advance without naming the new file. A warning screen indicates that the file cannot be found. Press <enter> to continue. Enter soil properties and field geometry data. Enter vegetation and operation data into the **DOABLE SCREEN**.

For example, the information for Big Spring in 1990 is shown in the RWEQ INPUT FORM below (Table 2.3.1). When all data have been entered into the **DOABLE SCREEN**, the F6 key is used to save the new management file. To the right of **Save Client File:** type **BST90** to name the client file and press <enter> and advance to the Save Man. File prompt. To the right of **Save Man. File:** type the name for the new management file just developed (**BST90.MAN**). The “.MAN” for the filename extension distinguishes it as a management file. Press <enter> and <Esc>. The filename is automatically added to the choice list.

Table 2.3.1

RWEQ INPUT FORM

CLIENT: BST90 WEATHER FILE: BST90.W1 MANAGEMENT FILE: BST90.MAN

Soil Properties: soil texture _____ OR sand 83.6 %
 silt 8.4 %
 organic matter 0.29 %
 calcium carbonate _____ %
 rock cover 0 %

Field Geometry: shape circ or rectangular
 area 6.5 acres
 orientation _____ ° from north
 length N _____ feet
 slope gradient _____ %
 slope length _____ feet

Longitude 101° 29' .19' Latitude 32° 16' .21' Elevation 2690 (820 m) Annual Rainfall 18.5" (470 mm)

DATE	VEGETATION				OPERATION / EVENT								--IRRIGATION--				BARRIERS						
	Residue	Yield	% Cov.	# Stems	Growing Crop	Implement	Mod. Hough	RR	Ridge	Spac.	Ht.	Orient.	Kill Crop	% Flat	% Stand.	Am.	Rate	# Days	Ht.	DI	Spac	Orient	
1/5/90	COTTON	0	4	0	NONE	PLANE	Y	0.1	200	1.0	0	Y	100	100									
4/16/90	COTTON	0	0	0	NONE	CH-STR	Y	0.9	12	2	0	N	70	70									
5/4/90	COTTON	0	0	0	NONE	NONE	N	0	0	0	0	N	100	100									

Figure 2.3.1

```

#File Creation Date: 02/18/98
#File Creation Time: 14:14:24
#New Mangement File : BST90.MAN

01/05/1990
+   Plane
+   NONE
+   R_Cotton 0.000000 4.000000 400.000000          9.250000 2.000000
+   0.000000 1.800000 0.200000
+   100.000000          100.000000
+   0.001000 0.010000 0.000100
+   -0.000250 4.000000 45.000000
+   1          0.100000 200.000000          1.000000 0.000000
+   1          0          0.000000 0.000000
+   0.000000 0.000000 0.000000 0.000000
+   0.000000 0.000000 0.000000
+   83.600000 8.400000 0.300000 0.000000 0.000000
+   0          6.500000 0.000000 0.000000 0.000000 0.000000

04/16/1990
+   CHI_STR
+   NONE
+   R_Cotton 0.000000 0.000000 400.000000          9.250000 2.000000
+   0.000000 1.800000 0.200000
+   70.000000 70.000000
+   0.001000 0.010000 0.000100
+   -0.000250 4.000000 45.000000
+   1          0.900000 12.000000 2.000000 0.000000
+   0          0          0.000000 0.000000
+   0.000000 0.000000 0.000000 0.000000
+   0.000000 0.000000 0.000000

05/04/1990
+   NONE
+   NONE
+   R_Cotton 0.000000 0.000000 400.000000          9.250000 2.000000
+   0.000000 1.800000 0.200000
+   100.000000          100.000000
+   0.001000 0.010000 0.000100
+   -0.000250 4.000000 45.000000
+   0          0.000000 0.000000 0.000000 0.000000
+   0          0          0.000000 0.000000
+   0.000000 0.000000 0.000000 0.000000
+   0.000000 0.000000 0.000000

12/31/1990

```

2.3.1.1 Inserting or deleting an operation/event in a management file To insert a new data line within an existing *saved* management file while in the **DOABLE SCREEN**, move the cursor to the **Date Start** column on the line with the date that should *follow* the new date. Press Shift/F5. RWEQ creates a blank line with a date which duplicates the date on the next line. Type over the date and complete the vegetation, operation, and barrier inputs.

To delete a line of data from an existing *saved* management file while in the **DOABLE SCREEN**, move the cursor to **Date Start** of the line to be deleted. Press Shift-F6. **WARNING:** After pressing Shift-F6, the line is deleted immediately from the management file. It may *not* be undeleted or recalled.

A modified file may be saved by using the F6 key. The original file is overwritten when the changes are saved to the original filename or when a line is deleted using Shift/F6.

To create a new version of a management file and keep the original file intact, first save the original file to a *new* filename using the F6 key. Go back to the **Man. File:** prompt in the main screen and enter the new filename. When a line is deleted in the DOABLE SCREEN using the Shift-F6 key, the changes are immediately saved to the new filename. Other changes made in the management file may be saved to the new filename using the F6 key.

2.3.1.2 Adding a management file to the choice list

When a new management file is developed, named, and saved in RWEQ using the F6 key, the filename is automatically added to the choice list.

2.4 SOIL

Soil texture and soil crust conditions are extremely important in controlling wind erosion.

The RWEQ program accepts generic soil data or data for a specific soil can be manually entered in the RWEQ program through the **Soil Properties** window. Physical and chemical properties for 12 different soil textures are available in RWEQ (APPENDIX E-3). These files are called into RWEQ when a soil texture is selected from the F2 choice list in the **Soil Properties** window. If data are available for the soil in a specific field, the default values for sand, silt, organic matter, CaCO₃, and rock cover may be overwritten. Regardless of the source of the data, the values accepted or entered in the **Soils Properties** window are saved as a part of the management file.

Soils data are used to estimate erodible fraction, soil crust, and the degradation by weathering of tillage roughness.

The clay content and soil crust factor are not input but are computed. Erodible fraction is computed but may be overwritten if soil sieving data are available. **WARNING:** An erodible fraction value that is overwritten is **NOT** saved in the management file.

On some Soil Interpretation Records rock cover may not be available. When rock cover is available and entered with other soil properties, RWEQ assumes a constant rock cover for the field. Rock cover is added to the flat residue cover to produce a single cover value for nonerodible elements; therefore, the flat cover is never less than the rock cover. The effect of a rock cover appears in the *V* column in the DOABLE SCREEN after erosion is calculated.

2.4.1 Customizing soil inputs within RWEQ

In the **Soils Properties** window with the cursor to the right of **Soil Texture:**, the F2 key is pressed to show the choice list of 12 files. When one is selected, default values are called into the program. Any of the properties may be overwritten to develop a unique soil file. The soil input file for a loamy sand (APPENDIX E-3) is shown below.

Percent sand	84
Percent silt	10
Percent organic matter	0.5
Percent CaCO ₃	2.0
Percent rock	0

This soil file may be changed by using the DOS editor and assigning the soil file a new name or may be changed for a single field by overwriting the soils values in the **Soil Properties** window.

2.4.2 Adding a soils file to the choice list

To add a new soils filename to the RWEQ choice list you *must* exit the RWEQ program. A new file of soils data can be added to the choice list from DOS. At the C:\RWEQ97> prompt type **EDIT RWEQ.CLS**. A portion of this file appears below. Scroll down to find “*soil” in the listing. At the end of this line press <enter> to create a blank line below “*soil”. Type the name of the new soil file. The line immediately under “*soil” appears first in the F2 choice list. Select SAVE from the FILE menu to save the new version of RWEQ.CLS (press ALT, F, S). Select EXIT from the FILE menu to exit the editor (press ALT, F, X).

```
YBTX95B.MAN
YETX95E.MAN
*soil
clay
clay_loam
loam
loamy_sand
sand
```

2.5 FIELD

The only field shapes available in RWEQ are circular and rectangular. If you select circular, RWEQ assumes circular rows and you do not have the option of putting in row orientation. For rectangular fields, enter the length of the north side. (See APPENDIX F-2.) RWEQ computes the length of the remaining side.

2.6 RESIDUE INPUT FILE

2.6.1 Developing and saving a residue crop file

Presently RWEQ has nine residue crop files. Research is being conducted on additional crops, but until these data are available, the RWEQ user may develop a new crop file based on knowledge of similar crops.

A file of residue data for a crop not in the choice list can 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 sorghum. Plant cover (canopy) estimates are assumed to be the same as sorghum.

Residue crop data files are designated with "R_". For kenaf the residue crop data file is "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 (11 lines for the file). 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.)	3000
Yield slope - (same as corn)	1.5
Crop height - <i>feet</i> (assume dryland)	6.0
Stem diameter - <i>inches</i> (assume dryland)	0.7
After harvest height - <i>feet</i> (cut entire plant for fiber)	0.3
Standing mass loss coefficient - (assume same as cotton)	0.0010
Flat mass loss coefficient - (assume same as cotton)	0.010
Stem number decline coefficient - (assume same as cotton)	0.0001
Mass/cover conversion coefficient - <i>ha/kg</i> (assume same as cotton)	-0.00025
Takeoff factor - (assume same as corn)	1.0
Stem number threshold decomposition days - (assume same as cotton)	45

After all coefficients have been entered, SAVE the file (press ALT, F, S) and EXIT the editor (press ALT, F, X).

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 residue information.

2.6.2 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. A new file of residue crop data can be added to the choice list from DOS. At the C:\RWEQ97> prompt type **EDIT RWEQ.CLS**. A portion of this file appears below. Scroll down to find “*rcrop” in the listing. At the end of this line press <enter> to create a blank line below “*rcrop”. Type the name of the new file (*e.g.* **R_KENAF**). The line immediately under “*rcrop” appears first in the F2 choice list. Select SAVE from the FILE menu to save the new version of RWEQ.CLS (press ALT, F, S). Select EXIT from the FILE menu to exit the editor (press ALT, F, X).

```
silty_clay
silty_clay_loam
*rcrop
NONE
R_Corn
R_Cotton
R_Grass
```

2.7 GROWING CROP INPUT FILE

Crop growth data are available for winter wheat, spring wheat, cotton, soybeans, corn, and sorghum. The RWEQ operator must select one with growth characteristics similar to the new crop. For kenaf, forage sorghum would be a good example.

When a crop is planted, the crop canopy development routine is initialized by the toggle “yes” in the “Growing Crop” query in the “**Residue and Growing Crop Information**” window.

2.7.1 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* **0.408**
Plant growth coefficient “b”, *pgcb* **-2273.16**

There are only two numbers in a growing crop input file. Choose SAVE from the FILE menu (press ALT, F, S). Select EXIT from the FILE menu to exit the editor (press ALT, F, X).

2.7.2 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. A new file of growing crop data can be added to the choice list from DOS. At the C:\RWEQ97> prompt type **EDIT RWEQ.CLS**. A portion of this file appears below. Scroll down to find “*gcrop” in the listing. At the end of this line press <enter> to create a blank line below “*gcrop”. Type the name of the new file (*e.g.* **G_KENAF**). The line immediately under “*gcrop” appears first in the F2 choice list. Select SAVE from the FILE menu to save the new version of RWEQ.CLS (press ALT, F, S). Select EXIT from the FILE menu to exit the editor (press ALT, F, X).

```
R_WBarley  
R_WWheat  
*gcrop  
G_Corn  
G_Cotton  
G_Grass  
G_SWheat
```

2.8 TILLAGE INPUT FILE

The input files for tillage implements may be modified to fit different regions of the country. To develop a file for an implement not listed, you must know the effect of the implement on soil surface characteristics in that region.

Terminology for describing tillage implements varies for different regions of the country. In RWEQ the RUSLE tillage data files are used to minimize variations within tillage implements.

Residue burial and decomposition in RWEQ are based on mass, not percent cover. In RWEQ buried residues remain buried and are not brought to the surface with tillage.

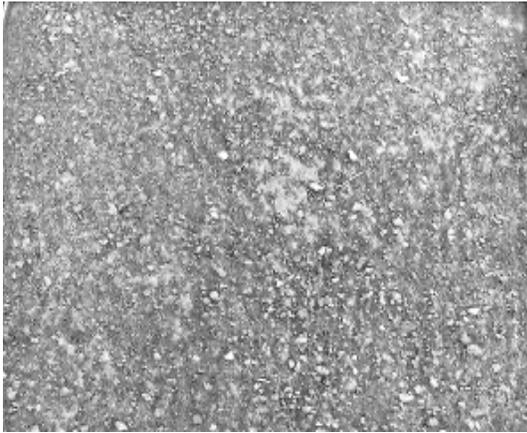
New tillage operations can be added by selecting values similar to other tillage operations. The generic values assigned to tillage implements for random roughness, ridge height, ridge spacing, % standing retained and % flat retained are in APPENDIX C-1. These values reflect Southern Plains conditions and may be modified for other regions of the country.

2.8.1 Determining soil roughness

A variety of roughness measuring methods have been developed. The optimum method depends on the intended use of the results. Because of the dynamic nature of the wind erosion process combined with the effect of rainfall, a simple method that allows many measurements across a field is preferred. A visual estimate is the cheapest but it may not provide reproducible estimates. The chain method (Saleh, 1993) does provide an economical and simple method of measuring soil roughness (APPENDIX H-2). The chain method (Saleh, 1993) can be expressed as random roughness (Allmaras *et al.*, 1966) using APPENDIX H-1.

Photographs of field surfaces with the corresponding random roughness are in Figure 2.8.1.

Figure 2.8.1



RR = 0.23



RR = 0.53



RR = 0.95



RR = 1.14



RR = 2.52

2.8.2 Developing and saving a tillage input file

For illustration purposes the creation of a tillage input file for a rotary hoe follows. This implement is used on moist soils to roughen the soil surface or to aid seedling emergence. The implement has minimal effect on ridge roughness. If the previous implement was a deep furrow drill with the rows 14" apart and ridges 3" high, the rotary hoe may leave ridges 14" apart and 2.5" high. You would have to keep a record of ridge height and spacing of the previous implement to properly input the rotary hoe. The random roughness is similar to a spike harrow (RR=0.4), but this may vary for different regions of the country. The rotary hoe is normally not used when large quantities of residue are on the surface or when residues are standing.

From DOS at the C:\RWEQ97> prompt type **EDIT ROTARY_H**. (There is an 8 character limit on the file name.) The file consists of 5 values (bolded) as shown below. The data file should have one value on each line (5 lines for the file). The filename identifies the data. The file itself contains only one column of 5 numbers.

Random roughness, <i>inches</i>	0.4
Ridge spacing, <i>inches</i> (previous implement- deep furrow drill)	14
Ridge height, <i>inches</i>	2.5
% Standing retained after harvest (assume rodweeder - plain)	90
% Flat retained after harvest (assume rodweeder - plain)	50

% Standing is that portion of the original standing residue that is not flattened by the tillage operation. % Flat retained is that portion of the flat mass residue not buried by the tillage operation.

After all of the data are entered, select SAVE from the FILE menu (press ALT, F, S) and then EXIT the editor (press ALT, F, X).

2.8.3 Adding a tillage file to the choice list

To add a new growing crop filename to the RWEQ choice list you *must* exit the RWEQ program. A new file of growing crop data can be added to the choice list from DOS. At the C:\RWEQ97> prompt type **EDIT RWEQ.CLS**. A portion of this file appears below. Scroll down to find “*Operation” in the listing. At the end of this line press <enter> to create a blank line below “*Operation”. Type the name of the new file (*e.g.* **ROTARY_H**). The line immediately under “*Operation” appears first in the F2 choice list. Select SAVE from the FILE menu to save the new version of RWEQ.CLS (press ALT, F, S). Select EXIT from the FILE menu to exit the editor (press ALT, F, X).

```
Circular
Rectangular
*Operation
CHI_STR
CHI_TWI
```

2.9 IRRIGATION

The application of irrigation water degrades soil roughness, increases soil wetness, and aids in decomposition of surface residues. Until data are available on the effect of different irrigation systems, *i.e.* furrow, flood, or sprinkler irrigation, they are all treated as equivalent to rainfall. Irrigation data from a specific period are input at the *beginning* of the period.

2.10 BARRIER INPUT DATA

2.10.1 Photos of optical density

To provide guidelines for optical density, photographs illustrating *OD* for annual crop barriers are in Figure 2.10.1 and for perennial evergreens are in Figure 2.10.2. Barriers are never uniform in height, configuration, or density; therefore, the best estimate should be used in place of measured values. Optical density normally reflects the density of the first row of a multirow barrier. Expressions are being evaluated that may permit the computation of density of each row and combining all rows into an optical density factor. Until this development is completed the photographs can be used.

2.11 OUTPUT

2.11.1 Saving and printing output in the DOABLE SCREEN

After erosion has been calculated (F10) and the <Esc> key is pressed, the soil loss by periods appears in the **DOABLE SCREEN** and may be printed using the PRINT SCREEN key. This output may also be saved to a file which may be printed. To save an output file press F6. Use the arrow key to move down to **Save Output File**. Enter a name for the output file to the right of **Save Output File:** and press <enter>. Press ESC to return to the main screen.

2.11.2 Viewing the tabular output

View the tabular output file by pressing F10 and selecting “Tabular Output”. The “Erosion Computation Summary” presents the erosion data by time periods. Use the arrow key to scroll down through the entire season. Press ESC to return to the “Run Menu” and press ESC again to return to the main screen.

2.11.3 Graphics

The output from RWEQ can be viewed graphically by pressing F4 after the output file has been saved with the F6 key. The estimated erosion, soil roughness, vegetation coefficient, and weather factor are graphed by 15 day periods. This allows the RWEQ operator to see when erosion is a problem. To return to program press CTRL/C.

NOTE: The graphics program incorporated in RWEQ is COPYRIGHTED and LICENSED SOFTWARE. It may *not* be reproduced in any way or used outside the RWEQ program. See APPENDIX M for software agreement.

Figure 2.10.1



Optical Density - 16 %



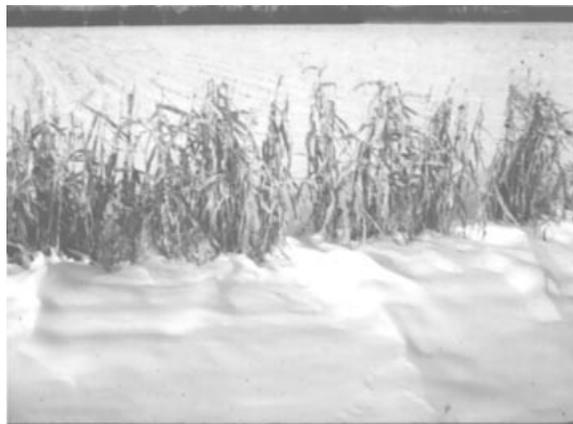
Optical Density - 42 %



Optical Density - 56 %

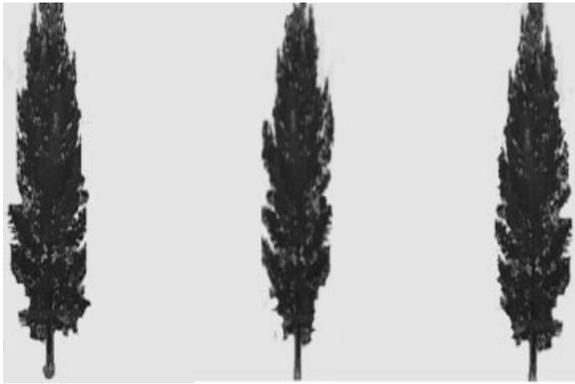


Optical Density - 61 %

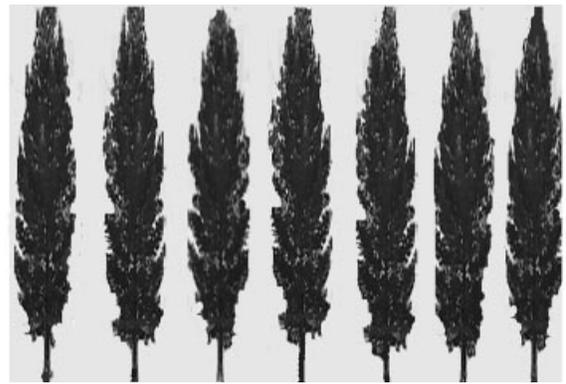


Optical Density - 63 %

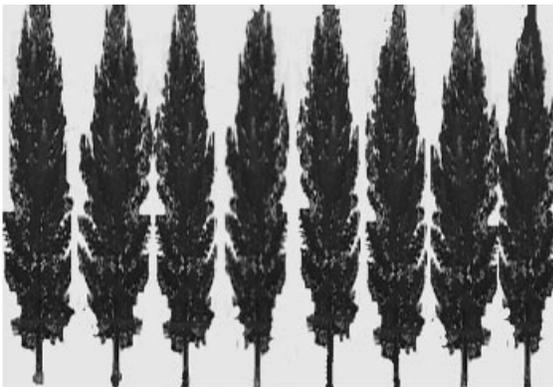
Figure 2.10.2



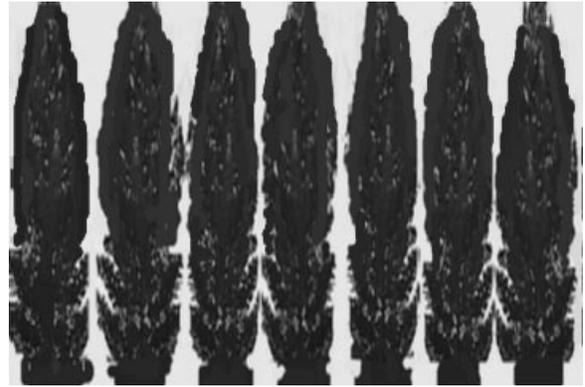
Optical Density = 25 %



Optical Density = 50 %



Optical Density = 60 %



Optical Density = 75 %



Optical Density = 100 %