Volume 1

DSSAT version 3

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IBSNAT, The International Benchmark Sites Network for Agrotechnology Transfer, is a network consisting of the contractor (University of Hawaii), its subcontractors and many global collaborators. Together they have created a network of national, regional and international agricultural research for the transfer of agrotechnology among global partners in both developed and lesser developed countries.

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DSSAT v3

VOLUME 1

VOLUME 1-1
INTRODUCTION

VOLUME 1-2
INSTALLATION

VOLUME 1-3
ACCESSING DATA, MODELS & APPLICATION PROGRAMS

VOLUME 1-4
CREATING MANAGEMENT FILES TO RUN MODELS & DOCUMENT EXPERIMENTS

VOLUME 1-5
CONVERTING FROM DSSAT v2.1 TO DSSAT v3 DATA FILES AND FORMATS

TABLE OF CONTENTS

VOLUME 1-1

INTRODUCTION

G. Y. TSUJI,
J. W. JONES,
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CHAPTER ONE.
THE IBSNAT PROJECT & DSSAT V3

IBSNAT

The Decision Support System for Agrotechnology Transfer (DSSAT) software and reference documents are products of the International Benchmark Sites Network for Agrotechnology Transfer (IBSNAT) Project. The DSSAT products represent the collective outputs of a number of scientists involved in IBSNAT's global network of collaborators. Support was provided, in part, by each collaborator's participating institution and agency and through a cooperative agreement (No. DAN-4054-A-00-7081-00) between the U.S. Agency for International Development and the University of Hawaii at Manoa.

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DSSAT v3 Development Team

Many individuals representing a number of institutions and organizations world-wide collaborated in different phases of the development of DSSAT v3. They are listed below in alphabetical order. The IBSNAT Project gratefully appreciates their contributions.

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CHAPTER TWO.
INTRODUCTION TO DSSAT V3

IBSNAT assembled and distributed a decision support software entitled DSSAT (Decision Support System for Agrotechnology Transfer) which enables its users to match the biological requirements of crops to the physical characteristics of land so that objectives specified by the user may be obtained. The decision support software consists of 1) a Data Base Management System (DBMS) to enter, store, and retrieve the "minimum data set" needed to validate, list and use the crop models for solving problems; 2) a set of validated crop models for simulating processes and outcomes of genotype by environment interactions; and 3) an applications program for analyzing and displaying outcomes of long-term simulated agronomic experiments. This decision support system is designed to answer "what if" questions frequently asked by policy makers and farmers concerned with sustaining an economically sound and environmentally safe agriculture. Sustainable agriculture requires tools that enable decision makers to explore the future. A decision support system must help users make choices today that result in desired outcomes, not only next year, but 10, 25, and 50 or more years into the future.

But what confidence can we place in such predictions? A decision support system which purports to predict outcomes in the future should be able to do the same for events in the past. Predicting outcomes of historical events is necessary to validate the system. In agriculture production outcomes are governed by weather, soil conditions, genetic make up of the crop, pests, and crop management. Predicting genotype by environment by management interactions clearly requires interdisciplinary research.

DSSAT v3 is a collection of computer programs integrated into a single software package in order to facilitate the application of crop simulation models in research and decision making. The overall goal of this system is similar to its predecessor, DSSAT v2.1 (IBSNAT, 1989); however, the DSSAT v3 data bases, models, application programs, and their linkages have undergone major revisions. The resulting system is much more flexible and has more functionality for data base manipulation and model applications.

The integration of the various components into an overall functional system was accomplished with two major components. First, a set of data requirements was defined along with standard files, data formats and conventions to facilitate uniform access by all programs and communications between them. These formats are fully described in Volume 2-1 (Jones et al. 1994) of this book. Secondly, the Shell program

was developed to allow users to interactively select any of the functions in DSSAT v3 without their having to know where the programs are or how they are communicating.

SYSTEM REQUIREMENTS

HARDWARE

Processor:	IBM 286 or better, or compatible micro computer Math co-processor required, 287 or better
RAM:	640K (minimum 590K free DOS RAM required)
Display:	VGA color
Hard Disk:	Required, approx. 12 MB for complete DSSAT v3

SOFTWARE

Operating System: DOS 3.3 or higher, or compatible

CHAPTER THREE.
DSSAT v3 OVERVIEW

SHELL

The DSSAT v3 Shell is a menu-driven program which enables users to easily select and use any of the DSSAT components. The Shell has five main menu items, each with various options: DATA, MODELS, ANALYSES, TOOLS and SETUP/QUIT.

The DATA main menu item provides users access to weather, soil and experiment data, similar to that of DSSAT v2.1. One major change is that the new data are all stored in ASCII files so that users can access and manipulate them more easily than in the v2.1 system. Some temporary dBase files are created to allow users to search for data or information contained in the data, also a new capability. There is also a program, Convert, in DSSAT v3 to convert ASCII model input files from DSSAT v2.1 into the new v3 file formats for crop management inputs, soil and weather data. This will allow users to more easily adapt to v3. Although there is no program to convert genetic coefficient data from the old system to the new formats, genetic coefficients for all crop models have been converted and are available in DSSAT v3 for simulation with the new model versions.

New data sections have also been added under the DATA main menu item. Now there is a CLIMATE section which deals with monthly data, which can be used to simulate daily weather data if daily data are not available for a site. This new feature allows users to input monthly data from published sources, such as FAO, and simulate crop performance. There is also a GENOTYPE section, which contains a new genetic coefficient calculation program to assist users when they have cultivars that are not in the genetic coefficient data file. There is a BACKGROUND section which allows users to obtain general information on the data contained in their system, and sections on PEST and ECONOMIC to store and handle pest and economic data. The new data definitions and crop model inputs and outputs are fully described in Volume 2-1 (Jones et al. 1994) of this book.

Under the MODELS section, users can access models for calibration, validation and sensitivity analysis purposes as before. Currently, models are available for various cereal crops (maize, wheat, sorghum, millet, rice and barley), three grain legume crops (soybean, peanut, and dry bean), and cassava. Generally, the three grain legume models operate using one program and the cereal crops operate with another

set of code, except for the rice model. The crop models now have a more modular structure with a separate input module that processes the new files to reduce program size and complexity.

A new crop model graphics program is also available. It is mouse-driven and creates plots of simulated and observed variables similar to the graphics package in DSSAT v2.1. This package, called Graphing of Simulated and Experiment Data, is much more flexible and can output graphs to printers or to files for inserting into other software. Also under each crop model section is a selection for REVIEWing the results from simulation runs. This feature allows users to view results on the screen, or print them out to save them for other purposes. It accesses an ASCII editor which is supplied with DSSAT v3, or one which is specified by the user during setup. This allows users to "install" their own editor into DSSAT or use a default one that is supplied.

Under the ANALYSES section, two choices appear: Season and Sequence. The Season option allows users to setup simulation experiments, simulate them and analyze the results, similar to the strategy evaluation mode in DSSAT v2.1. It provides access to the interactive model input creation program, XCreate, which sets up one or more strategies to compare, for one or more crops. As was the case in DSSAT v2.1, the initial conditions are reset in this mode for each run, so that results represent the variability expected if the practices were implemented with fixed starting conditions. In addition to having the new XCreate program to setup runs and new crop model versions, DSSAT v3 also has a new seasonal evaluation program which will be described in more detail below. The second option under ANALYSES is to simulate sequences of crops, such as in crop rotations, for studying the long term effects of practices on crop and soil performance, with emphasis on time trends and uncertainty.

Under the TOOLS section, users can access their disk manager (such as XTREE), their editor and spreadsheet, or go to the DOS prompt temporarily without leaving DSSAT. These tool options were not available in DSSAT v2.1, and users found it inconvenient to exit and restart DSSAT when some other task had to be performed.

The SETUP/QUIT section is similar to the SETUP menu option in DSSAT v2.1, but more items can be setup or installed in DSSAT v3, such as the tools described above and managers of the different types of data, in addition to the models and analyses programs.

For a comprehension description of the DSSAT v3 Shell and its operation, see Part 3 of this Volume (Volume 1-3, Hunt et al 1994) .

CROP MODELS

The crop models in DSSAT v3 are new versions created by modifying models from DSSAT v2.1. The cereal crop models were basically integrated into one program referred to as the generic CERES model, and includes maize, wheat, sorghum, millet and barley. The rice model is a stand-alone model based on a CERES-Rice v2.1 conversion to v3 data files and formats. The grain legume models (SOYGRO, PNUTGRO, and BEANGRO) all operate using a generic grain legume model structure, called CROPGRO. The aroid and potato crop models have not yet been converted to the DSSAT v3 file and format structures. The cassava model uses the CROPSIM model structure, which is similar to the CERES models.

CERES

The five cereal models were combined to run with a single set of code by incorporating the development and growth sections from each individual model into a single module with a single soil component. This new module, called CERES, uses the DSSAT v3 input/output file structures and formats, and it is fully compatible with the graphics program, genetic coefficient calculator, and season analysis programs in v3. The input file for genetic coefficients, formerly referred to as GENETICS.MZ9 for maize, has been modified to adapt it to the genetic coefficient calculator program. The new genetic coefficient data file for maize is called MZCER940.CUL, to note that this file is for maize using the generic CERES model version 94-0. The genetic coefficients themselves have not been modified for the cereal crops, but their formats have been. Genetic coefficients for all cultivars in v2.1 have been converted and are available for simulation with the new crop model versions.

CROPGRO

The three grain legume models were also combined to operate under a single module, CROPGRO. In this new module, nitrogen components for the soil and plant system were added, including simulation of nitrogen uptake, fixation and mobilization. The crop carbon and nitrogen balance sections were restructured, and an option was added to simulate photosynthesis at the leaf level, using hourly time steps. Simulation of vegetative and reproductive development were modified, allowing more flexibility for defining the effects of temperature, photoperiod, drought and nitrogen stresses on development during the various soybean growth phases. Other new features include options to simulate the effect of a potential climate change on soybean growth and the effect of pest interactions on soybean productivity.

Evapotranspiration Calculations

In the CERES, CROPGRO and the other DSSAT v3 models, options exist for the Priestly-Taylor method for computing potential evapotranspiration, and for the Penman method using the FAO definitions of the wind term. The Priestly-Taylor method is the same as used by Ritchie (1985). The use of the Penman method requires daily humidity and wind speed data. The new weather file format includes columns for these data when they are available. When they are not available, users should select the Priestly-Taylor method.

Carbon Dioxide Effects

The new models have the capability to simulate the effects of CO_2 on photosynthesis and water use. Daily potential transpiration is modified by CO_2 concentration based on the effects of CO_2 on stomata conductivity (Peart et al., 1989). A multiplicative modification is made to daily canopy photosynthesis as described by Curry et al. (1988).

Climate Change Studies

The DSSAT v3 models have the capability to modify daily weather data that are read in from the weather file, as well as day length. Each weather variable can be modified, by multiplying a constant times the input value and/or adding a constant to it. This gives one the flexibility to change one or all weather variables and includes the capability to make them constant, as in constant environment experiments. Users can specify the date that a given modification is to begin, and can have more that one entry if the experiment included environment switching of any type. These options are available in FILEX for any experiment and are also available interactively during any model run.

Weather Generators

The new models have built-in capabilities for simulating weather using either one of two generators. Coefficients for generating weather are in *.CLI files, such as UFGA.CLI, where UFGA is the site of the weather station. One generator is SIMMETEO (Geng 1986) which requires only monthly averages of solar radiation, maximum and minimum temperatures, precipitation, and days with precipitation. This model then computes coefficients and uses the WGEN to simulate daily data. The second generator is WGEN (Richardson 1985), which requires more statistics which are computed from daily data from a number of years. This ability to simulate weather internally, using only monthly averages of variables will greatly expand the application of the models to areas where the monthly data are all that are available.

Crop Rotations

An option in the models allows users to select whether to reinitialize soil variables after each run or to use ending conditions from one run as inputs to the next run. This allows for crop rotations to be studied in the new models, with carry over effects in the soil currently limited to crop residue, soil N, carbon and water with depth. A sequence model "driver" is available to run the different crops in sequence, including a fallow period between crops. Any number of years of a crop rotation can be simulated in multiple replications, as specified by the user. A sequence analysis program analyzes time trends and variability in crop performance of the sequences.

For a comprehension description of the DSSAT v3 crop models, see Volume 2-2 (Hoogenboom et al. 1994) of this book.

VOLUME 1-2

INSTALLATION

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CHAPTER ONE.
GETTING STARTED

Before you begin the installation of DSSAT v3, turn on your computer and make sure your system has everything you need. See Part 1 of this Volume (Volume 1-1, Tsuji et al. 1994) for a description of system requirements.

Make backup copies of the distributed disks by using the DOS "DISKCOPY" command. Store the original disks in a safe place. The copies are your working disks. If they should become damaged or destroyed, use the original disks to restore DSSAT v3.

Take a moment now to read the file named "README" which will be found on the DSSAT Installation Disk #1. This file contains any changes or instructions incorporated into DSSAT v3 after this book was published.

CHAPTER TWO.
DSSAT INSTALLATION

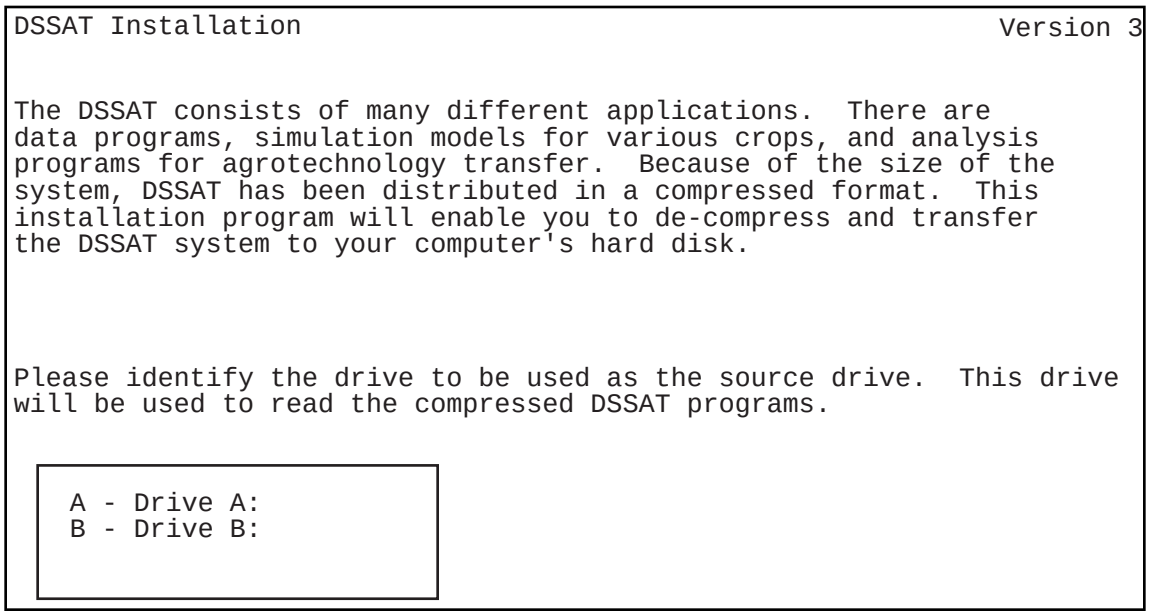
DSSAT v3 consists of many different applications, including data programs, various crop simulation models and analysis programs for agrotechnology transfer. Its size necessitates the distribution of the system in a compressed format. All DSSAT v3 programs stored on the distributed disks are compressed using an archive utility. The Installation program found on the DSSAT Installation Disk #1 enables users to de-compress and transfer DSSAT v3 to a computer's hard drive.

BEGIN INSTALLATION

To start the DSSAT installation, place the DSSAT Installation System Disk #1 in drive A. Change the DOS System C > prompt to the A > prompt. At the A > prompt, type "INSTALL," as shown:

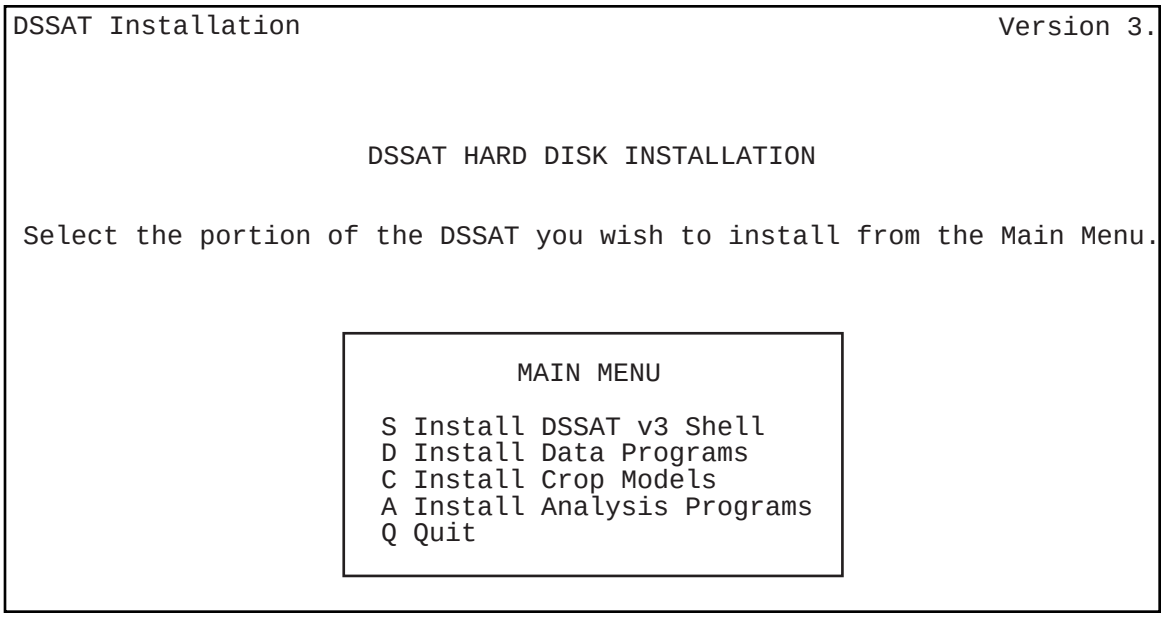
A>INSTALL

A title screen (Screen 1 on the following page) with a description of the purpose of the installation program will be presented.



SCREEN 1.

In Screen 1, identify the drive used as the source drive. The source drive is used to read the archived files from the DSSAT installation disks. Select a drive from the menu by highlighting "Drive A" or "Drive B" and then pressing the <ENTER> key, or press the <A> or <B> key.



SCREEN 2.

After selecting the source drive, Screen 2 (above) displaying the DSSAT Installation main menu will be presented. The installation program allows you to selectively install any program in DSSAT. However, it is suggested that you install the DSSAT Shell before any other application.

When an option is selected from the menu, you will be prompted to insert the appropriate disks. You will be then asked for the location (drive and pathname) of the programs. A default location for each program will be given at the prompt after an option from this menu has been selected. You can either keep the default information, by pressing the <ENTER> key, or enter another drive and path-name.

To select one of the options listed in Screen 2, highlight one of the items by using the arrow keys and then press the <ENTER> key, or press the <S>, <D>, <C> or <A> key to install the Shell, Data Programs, Crop Models or Analysis Programs, respectively.

After the desired programs are installed, select "Q Quit" from the main menu to exit.

CONFIGURE YOUR SYSTEM & START DSSAT v3

Be sure you have a CONFIG.SYS file with the following statements in the root directory of your hard disk.

```
FILES=30
BUFFERS=30
DEVICE=ANSI.SYS
```

In your AUTOEXE.BAT file, add the drive and pathname of the DSSAT v3 main directory (i.e. C:\DSSAT3), the path statement and the statement:

```
set DSSAT3 = C:\DSSAT3
```

For example:

```
PATH C:\DOS; C:\DSSAT3; C:\UTIL
SET DSSAT3 = C:\DSSAT3.
```

After adding these statements to the CONFIG.SYS and AUTOEXE.BAT files, you need to re-boot your computer before running DSSAT v3.

To start DSSAT v3, type "DSSAT3" at the DOS System C> prompt.

VOLUME 1-3

ACCESSING DATA, MODELS & APPLICATION PROGRAMS

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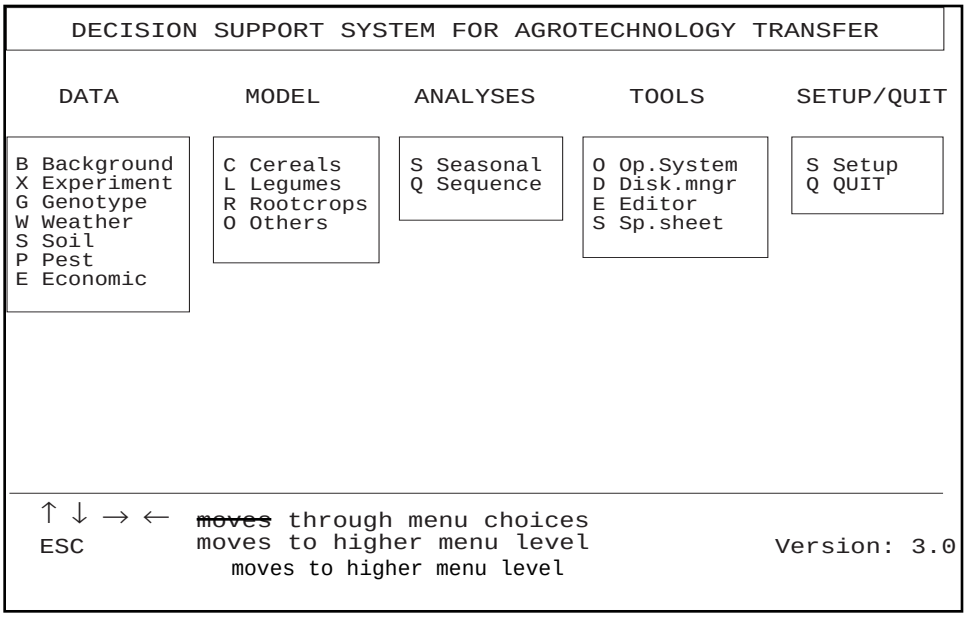
CHAPTER ONE.
INTRODUCTION

The DSSAT v3 Shell (Screen 1, shown below) is the interface between the user and the crop models, application programs and data files found in DSSAT v3. The Shell is menu-driven and thus enables users to easily select and use any of the DSSAT components. These components are displayed as menu items under the DSSAT title. Screen 1 shows the main menu items of the Shell and their corresponding menus.



SCREEN 1.

DSSAT MAIN MENU

When DSSAT v3 is opened, the Shell, shown in Screen 1, will be presented. The DSSAT v3 Shell has 5 main menu options: DATA, MODELS, ANALYSES, TOOLS, SETUP/QUIT. Although Screen 1 shows all the menu options available under the Shell's main menu items, this will not be the case when actually using DSSAT v3; instead DSSAT v3 will open with the DATA main menu options listed. At the bottom of this screen is a display box which will present a description of any highlighted menu choice. For example, when the "B Background" menu option

under DATA is highlighted, the description will read:

"Institutes, sites, and researchers; fields; and codes for data"

This means that by selecting this menu choice you will be able to access the described items.

GUIDELINES

The Shell interface is made up of menus, windows and dialog boxes. The user interacts with DSSAT v3 through the Shell using the menus and windows and the DSSAT program displays information for the user via windows. The mouse is not active in the Shell menu. However, in some of the programs called from the Shell, and described herein, the mouse can be used. If a screen displays a scroll bar, mouse use is available for that screen. To move through data fields presented on screen or to highlight items without a mouse, use the arrow keys or the <SHIFT> and <SHIFT><TAB> keys may be used. To determine which of these key methods to use, look on the screens presented. A message will be displayed if the <SHIFT> and <SHIFT><TAB> keys are to be used. Also, the method to use is described herein for each screen illustrated.

KEYBOARD COMMANDS

Following is a list of keyboard commands that can be used in most screens presented in DSSAT v3.

<ESC>	Cancel/Exit the current dialog box or menu.
<F1>	Context sensitive help.
<TAB>	Move to the next data entry field or dialog item.
<SHIFT>-<TAB>	Move to the previous data entry field dialog item.
Up Arrow	Move up a list of items.
Down Arrow	Move down a list of items.

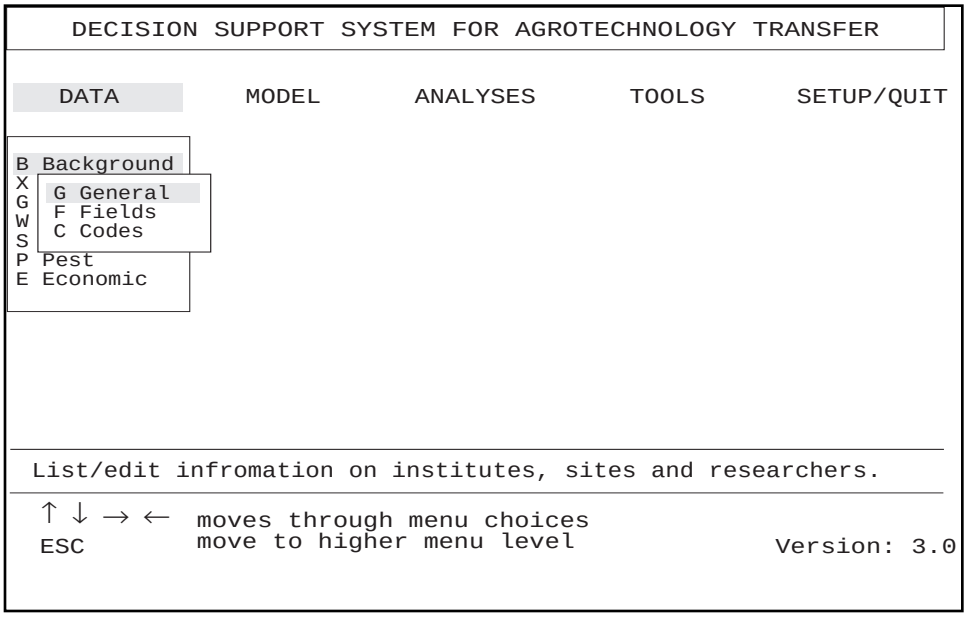
CHAPTER TWO.
DATA MENU OPTIONS: INTRODUCTION

Under the DATA menu item of the DSSAT v3 Shell are options which provide users with access to various types of data on experiments, crops, weather, soils, climate, economics, and pests. Most data in DSSAT are in ASCII files which can be manipulated with text editors and various other software, such as spread sheets. These data are found under the option headings: BACKGROUND, EXPERIMENT, WEATHER, SOIL, PEST and ECONOMICS. Each of these options have various submenu which are accessed when one of the options is selected. For example, the Utilities for entering, searching, graphing, printing, and maintaining data for easy access and use with crop simulation models are also found under the DATA menu.

For ease of reading and operational use, each of the options found under the DATA menu item is described in a separate chapter herein.

CHAPTER THREE.
DATA MENU OPTION: BACKGROUND

To access the "Background" menu option under the DATA main menu item, highlight DATA and then press the <B> key or move the highlight bar with the arrow keys to "Background" and press the <ENTER> key. A menu of options available (shown in Screen 2, below) will be presented.



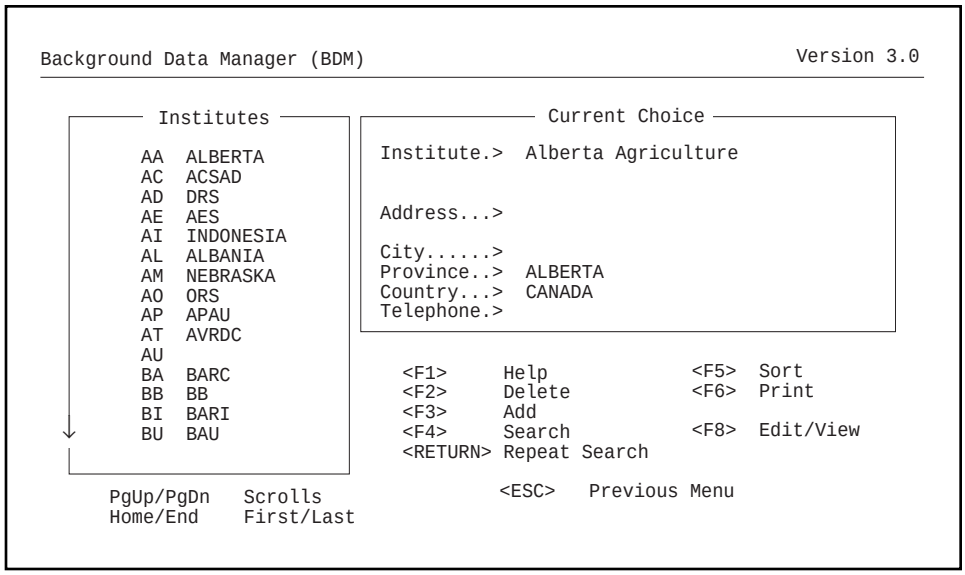
SCREEN 2.

GENERAL

The purpose of the "General" menu option is to provide access to information on Institutes, Sites, and People, such as addresses, experiments performed. It also allows users to view and print out the information and to allow for additions, deletions or changes in the data.

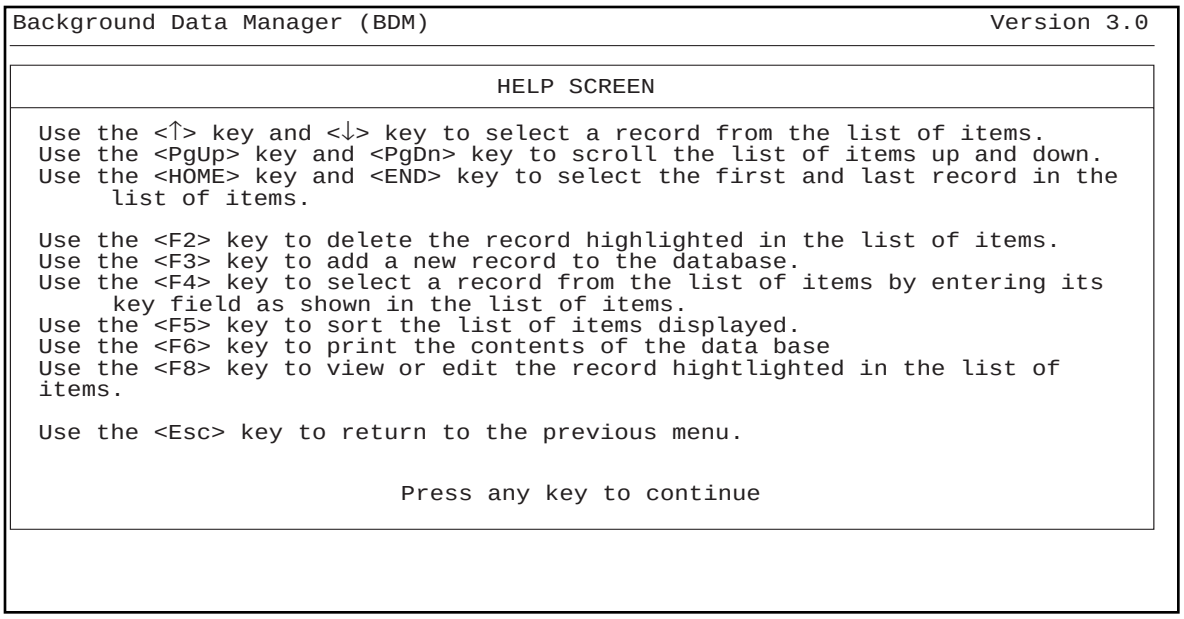
To open this menu option, press the <G> key or highlight "General" and press the <ENTER> key. A submenu will be presented from which you can select "I Institutes," "S Sites" or "P People." Select one of these items by highlighting

and pressing the <ENTER> key or by pressing the <I>, <S> or <P> key, respectively. Since the screens and the information accessed for each of these subjects are similar, only the screen for Institutes will be shown (Screen 3 below) to demonstrate the operation of these menu items.



SCREEN 3.

When “I” for “Institutes” is selected, the screen presented displays a left window listing all the Institute ID codes and their corresponding institutes found in DSSAT v3. Use the arrow keys to highlight one of the listings. The box labeled “Current Choice" in the right window will display information about the institute highlighted. Use the <F> keys listed below this window to get access to help, printing, editing, and other functions. When the <F6> key is selected, the contents of the insitute data base will be printed to a printer or to an ASCII file. The file will be named INSTITUTE.PRN and it will be located in the C:\DSSAT3\BACKGRND path. When the <F2>, <F3> or <F8> keys are used, a dialog box is presented in which you can, respectively, delete an institute ID code and its corresponding information from the list, add a new one to the list or edit one. Pressing the <F1> “Help” key displays the following screen (Screen 4).

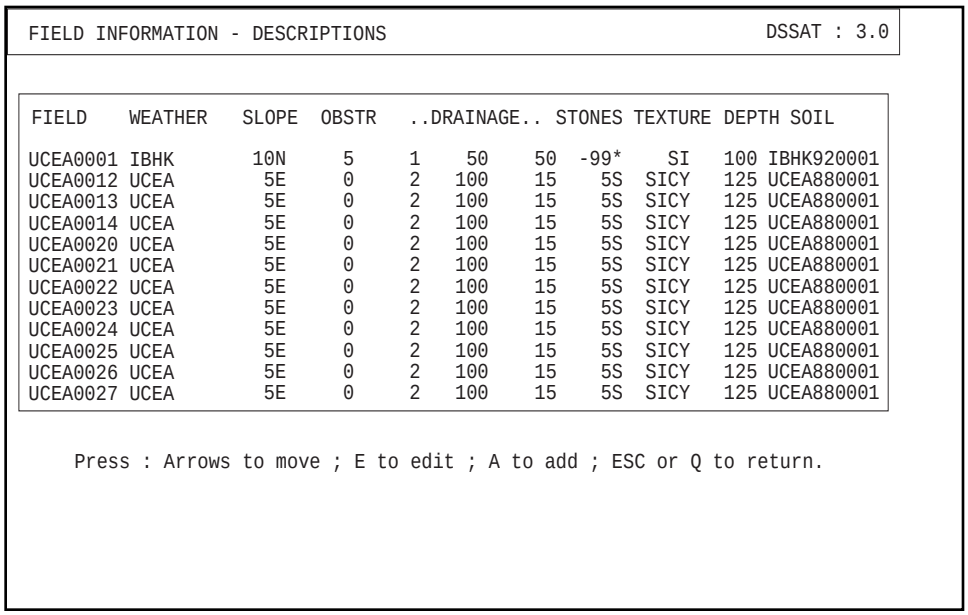


SCREEN 4.

FIELDS

The purpose of the "Fields" menu option is to help users review and edit description data on fields and soil analysis data from the field. The formats of data in the ASCII files that stores this information are the same as those used in the FILEX, or experiment details file, for the *FIELD and *SOIL ANALYSIS sections for individual experiments (see Volume 2-1, Jones et al. 1994, of this book for a description of these formats). The files accessed through the "Fields" menu option are used to store information on many fields and any historical data on soil analyses.

To open this menu option, press the <F> key or highlight "Fields" and press the <ENTER> key. A submenu will be presented from which you can select "D Descriptive Data" or "S Soil Analysis Information." Select one of these items by highlighting it and pressing the <ENTER> key or by pressing the <D> or <S> key, respectively.



FIELD INFORMATION - DESCRIPTIONS DSSAT : 3.0

FIELD	WEATHER	SLOPE	OBSTR	..DRAINAGE..		STONES	TEXTURE	DEPTH	SOIL
UCEA0001	IBHK	10N	5	1	50	50 -99*	SI	100	IBHK920001
UCEA0012	UCEA	5E	0	2	100	15 5S	SICY	125	UCEA880001
UCEA0013	UCEA	5E	0	2	100	15 5S	SICY	125	UCEA880001
UCEA0014	UCEA	5E	0	2	100	15 5S	SICY	125	UCEA880001
UCEA0020	UCEA	5E	0	2	100	15 5S	SICY	125	UCEA880001
UCEA0021	UCEA	5E	0	2	100	15 5S	SICY	125	UCEA880001
UCEA0022	UCEA	5E	0	2	100	15 5S	SICY	125	UCEA880001
UCEA0023	UCEA	5E	0	2	100	15 5S	SICY	125	UCEA880001
UCEA0024	UCEA	5E	0	2	100	15 5S	SICY	125	UCEA880001
UCEA0025	UCEA	5E	0	2	100	15 5S	SICY	125	UCEA880001
UCEA0026	UCEA	5E	0	2	100	15 5S	SICY	125	UCEA880001
UCEA0027	UCEA	5E	0	2	100	15 5S	SICY	125	UCEA880001

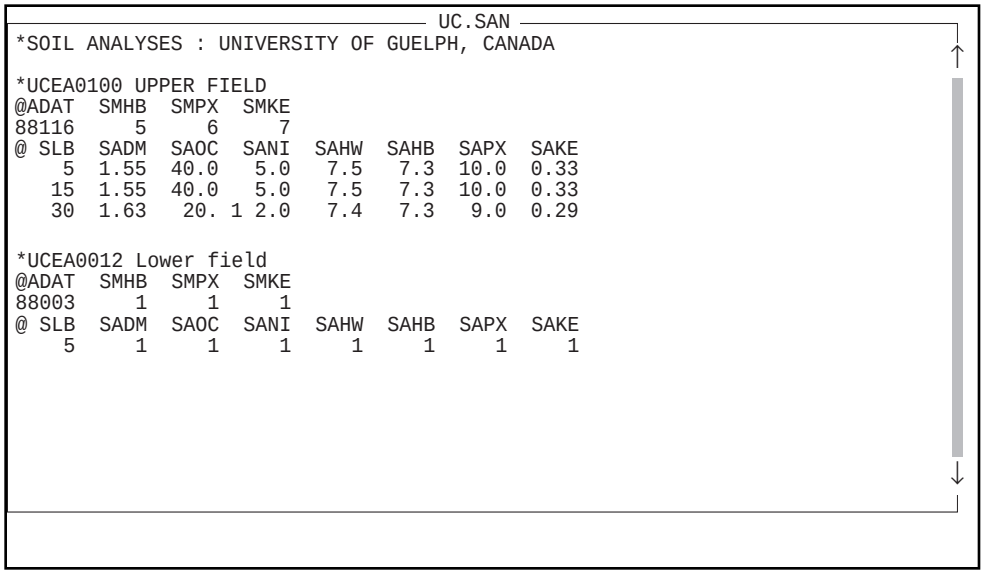
Press : Arrows to move ; E to edit ; A to add ; ESC or Q to return.

SCREEN 5.

DESCRIPTIVE DATA

When "D Descriptive Data" is selected from the "Fields" submenu, Screen 5 (above) will be presented. You can scroll through the list of actual fields with the arrow keys, edit the data, or add a new field location and data. If you highlight a field in the list and then press the <E> key to edit it, the file (FIELD.LST) containing the highlighted field's information is accessed either by the editor supplied with DSSAT v3 or one that you have installed. The format of any data you enter must adhere to the specifications given in Volume 2-1 (Jones et al. 1994) of this book.

Press the <A> key to add a new field. A series of screens will be presented in which you will be asked to enter specific data for each column listed in Screen 5. Follow the instructions on each screen. When all entries have been completed, the data you have entered for the field and its name will be added to the list shown in Screen 5.



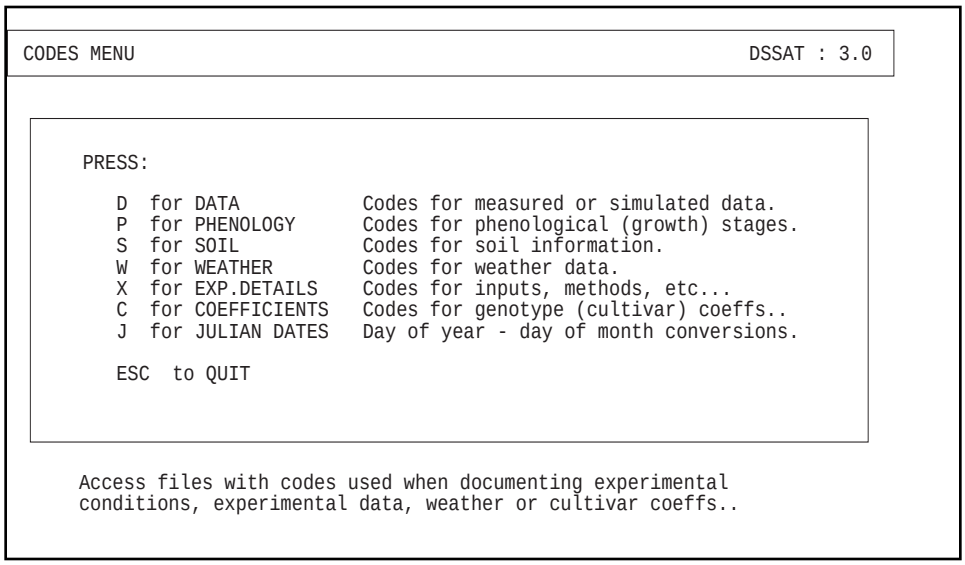
SCREEN 6.

SOIL ANALYSIS INFORMATION

When "S Soil Analysis Information" is selected from the "Fields" submenu, a screen displaying a list of experiment fields with soil analyses data available in DSSAT v3 will be presented. To edit the data in any of the fields presented, highlight one of the fields using the arrow keys and press the <E> key. A screen similar to Screen 6 (above) will be presented. Scroll through this screen using the scroll bars on the right, or the arrow keys, and edit the data using either the editor supplied with DSSAT v3 or one that you have installed. The format of any data you enter must adhere to the specifications given in Volume 2-1 (Jones et al. 1994) of this book. Additional data may also be added to a selected field using an editor. Enter new fields and data with an editor, following the example formats shown below the * in the screen above and by naming the field ??.SAN, where ?? is the Institute ID code.

CODES

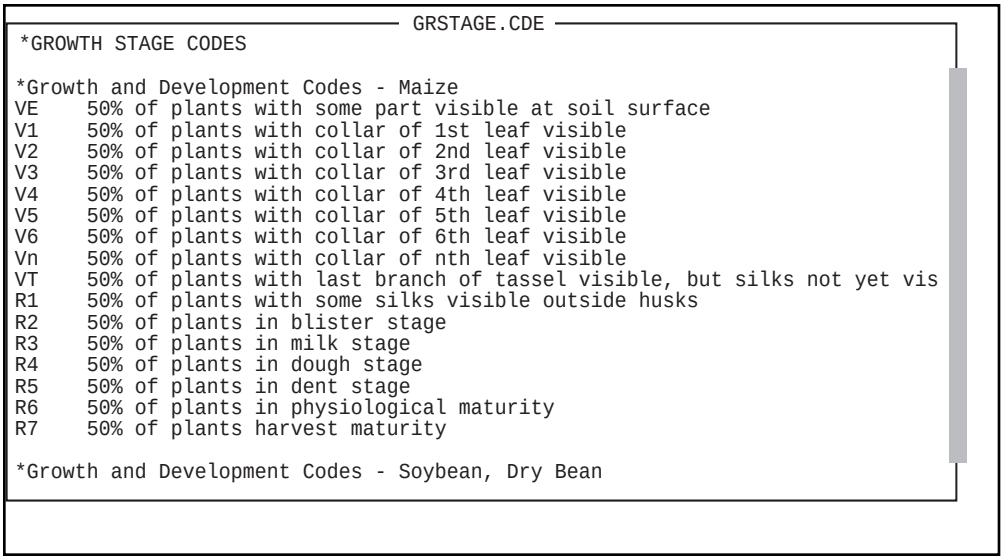
The purpose of this menu option is to give users access to information on codes used for specifying fertilizers, chemicals, growth stages, and other management inputs as well as abbreviations for data that are observed or simulated. Access to these files is with a user-installed text editor. The path to a user's editor and the name of the executable file must be installed from the SETUP main menu item of the DSSAT v3 Shell (see Chapter 13, "SETUP/QUIT Menu Options").



SCREEN 7.

To open this menu option, press the <C> key or highlight "Codes" and press the <ENTER> key. A submenu will be presented from which you can select any of the options shown in Screen 7 (above).

Select one of these menu options by pressing the <D>, <S>, <W>, <X>, <C> or <J> key, respectively. Codes pertaining to each of these items will be presented, as illustrated for "S for Stages" in Screen 8 below; but the actual screen presented will depend on a user's editor.



SCREEN 8.

CHAPTER FOUR.
DATA MENU OPTION: EXPERIMENT

To access the "Experiment" menu option under the DATA main menu item, highlight DATA and then press the <X> key or move the highlight bar with the arrow keys to "Experiment" and press the <ENTER> key. The purpose of the "Experiment" menu option is to provide access to experimental data management functions, including inputting, editing, graphing, listing, linking them to models, and printing. When it is accessed, a menu of three options will be presented: "L List/Edit," "C Create" and "U Utilities."

LIST / EDIT

The purposes of the "List/Edit" menu option are as follows.

1. Lists all experiments in a particular directory, giving, for each experiment, the file name, the crop code, standard and local experiment names and a brief description of the experiment. Keeps this list of files in a file named EXPLST.DBF, which is updated after new experiments are added using the<F9> key.
2. Provides access to any of the experiment files (FILEXs), with the <F8> key, using a file editor. Users can choose experimental data files (FILEXs) and crop performance averages (in FILETs and FILEAs). Access is with either a user-installed text editor or the editor supplied with DSSAT v3.
3. Allows for sorting of files to locate experiments for specified crops, standard or universal names, or local names. Sorting is performed by placing the cursor in a column to search on and then pressing the <F5> key to initiate the search.
4. Updates the experiment list (EXP.LST) read by the crop models to include new experiments or to reduce the number of experiments that are listed for model simulation. Allows users to toggle any experiment in the path to be included or excluded form EXP.LST, using the <L> key.
5. Allows users to search and locate experiments in the current path based on the types of treatments included in the experiment, on types of soils, on people who conducted the experiment and on experiments performed at specific institutes. Use the <F4> key.
6. Allows users access to a global list (EXPLSTG.DBF) of experiments for all crops in all DSSAT v3 directories, using the <F10> key. Allows users to select experiments in other paths, and presents experiments in the paths selected in

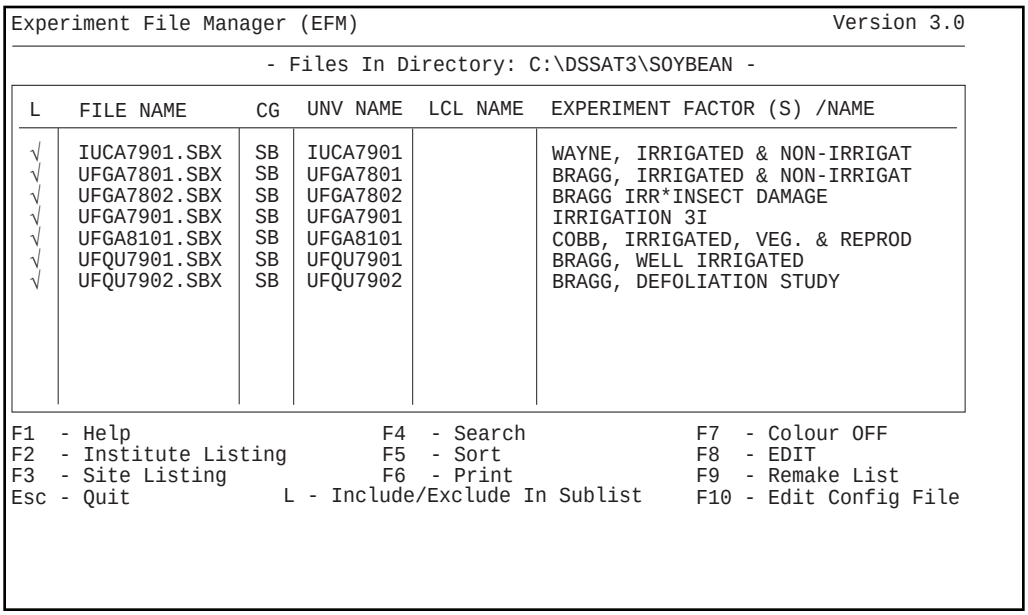
order to maintain the EXP.LST for each crop.

```
Experiment File Manager (EFM)                                    Version 3.0
                    - Files In All Installed Directories -
   FILE NAME      CG   UNV NAME   LCL NAME   EXPERIMENT FACTOR (S)/NAME
   CCPA7802.CSX   CS   CCPA7802   VELTKAM1   CULTIVARS 4C
   CCPA7901.CSX   CS   CCPA7901   VELTKAM2   CULTIVARS 4C
   CCPA8001.CSX   CS   CCPA8001   VELTKAM3   CULTIVARS 4C
   CCPA8629.BNX   BN   CCPA8629              3 CULTIVARS, 2 ROW WIDTHS, 2 DENS
   CCSA7901.CSX   CS   CCSA7901   CONNOR     DROUGHT 2C*2DR
   DTSP8502.RIX   RI   DTSP8502              EFFECTS OF APPL. N & ENVIR. ON RI
   FLSC8101.MZX   MZ   FLSC8101   CERES MA   N X IRRIG., S.C.
   IBSI8001.MZX   MZ   IBSI8001              MULTI-YEAR TEST, SITIUNG
   IBWA8301.MZX   MZ   IBWA8301              N X VAR WAPIO, IBSNAT EXP.1983-4
   ICTH8001.WHX   WH   ICTH8001              TEL HADYA SYRIA MULTIPLE YEAR RUN
   IFRO7401.WHX   WH   IFRO7401              ROTHAMSTED ENGLAND 1975
   IFSW7501.WHX   WH   IFSW7501              SWIFT CURRENT CANADA 1975
F1  - Help                    F4  - Search              F7  - Colour OFF
F2  - Institute Listing       F5  - Sort                F8  - EDIT
F3  - Site Listing            F6  - Print               F9  - Remake List
Esc - Quit                                              F10 - Working List
```

SCREEN 9.

To open the “List/Edit” menu option, press the <L> key or highlight “List/Edit” and press the <ENTER> key. Screen 9 (above) will be presented, displaying the global list of experiments with each crop code, experiment name and a summary of experimental factors. The UNV NAME is the name according to the naming convention described in Volume 2-1 (Jones et al 1994) of this book, whereas the LCL name could be any identifier that the user wishes to have. The general <F> key functions for searching, sending, printing and editing are similar to those described under Screen 3 in Chapter 3. Tbere are two keys that need additional explanations.

The Database List shown in Screen 9 includes files in all directories identified with an EXD code in the file DSSATLST.FLE; in other words, it is a global listing. This file is similar to DSSATPRO.FLE, but it also contains pointers to any path in your computer that has experimental data. DSSATLST.FLE is found in the C:\DSSAT3 directory and can be edited by any text editor to add new paths. If the DSSATLST.FLE file is edited, you must press the <F9> key to re-build the global experiment list. The Working List (key <F10>) displays a list of experiments in the working directory. The working directory can be changed by moving the highlight bar over a particular experiment and pressing the <F10> key.



SCREEN 10.

The program will then transfer to the directory containing that experiment and list all experiments in that directory. You can go back to the global list by pressing the <F10> key again.

The screen for the Working List is shown in Screen 10. While viewing this screen, you have access to various function keys. They are the same as those for the Database (or Global) List, except for the <L> key. By highlighting a particular experiment and pressing the <L> key, that experiment is marked so it can be accessed by the crop models. Note the last column on Screen 10 is headed by an "L" with check marks in his column for particular rows. The experiments checked will be written to the EXP.LST file in the working directory so that models can access those experiments. This will allow many experiments to be stored on a disk. In Screen 10, the EXP.LST will be written to the path C:\DSSAT\SOYBEAN with all experiments listed (checked) for model access.

The purpose of the "Create" menu option is to enable the user to create an experi-

CREATE

ment description file (FILEX), which is used as an input file to the crop models, using the program entitled XCreate. Users can define treatments for a new experiment as well as the crop management inputs used to manage the experiment. These includes field information, initial conditions, irrigation, fertilizer management, residue management, cultivar, and other data needed to specify experimen-

tal conditions. Users can select an existing experiment from those in the current path (listed in EXP.LST) and modify it to create a new experiment, or they may start with an empty file and enter all data for a particular experiment. XCreate can be used to enter real experiments as well as hypothetical ones for sensitivity analysis, risk analysis, etc. It also allows users to specify Simulation Control options.

To open the “Create” menu option, press the <C> key or highlight “Create” and press the <ENTER> key. A complete description of the XCreate program and its use are described in detail in Part 4 of this Volume (Volume 1-4, Imamura 1994). The purpose of the "Utilities" menu option is to allow the user to review crop per-

UTILITIES

formance data, compute averages from replicate data, and display graphs of measurements made within the growing season (time series graphs) and summary responses. From within this menu option, users may also convert DSSAT v2.1 model input and experimental data files into the file formats of DSSAT v3.

To open this menu option, press the <U> key or highlight “Utilities”and press the <ENTER> key. When it is accessed, a menu of three options will be presented: ”L List/Edit,” G Graphs” and “C Convert.”

LIST/EDIT

The “List/Edit” utility allows the user to list and edit crop performance data stored in FILEA, FILET, or FILEP files. These files are described in Volume 2-1 (Jones et al. 1994) of this book.

To open the “List/Edit option, press the <L> key or highlight “List/Edit” and press the <ENTER> key. A submenu listing the crops in DSSAT v3 will be presented. After a crop is selected, a screen will be presented which displays all of the time series, seasonal average, and crop performance (replicate) data files (T, A, and P, respectively) found in the directory specified in the DSSATPRO.FLE for that crop. Screen 11 (shown on the following page) is an example screen showing these files for Soybean.

The list that is made from this collection of data files is not used by the crop models. The <F10> button in Screen 11 allows you to specify an alternate name for this list and you can configure wild card inclusions and exclusions from the list.

```
General File Manager - Experiment data                          Version 3.0
                    - Files In Directory: C:\DSSAT3\SOYBEAN -
 L   FILE NAME      FILE HEADING
     FILEX.RPT      EXP.DETAILS: UFGA7801SB BRAGG, IRRIGATED & NON-IRRIGATED
     IUCA7901.SBA   PERFORMANCE DATA - AVERAGE VALUES
     IUCA7901.SBT   PERFORMANCE DATA - TIME COURSE OF AVERAGE VALUES
     UFGA7801.SBA   PERFORMANCE DATA - AVERAGE VALUES
     UFGA7801.SBT   PERFORMANCE DATA - TIME COURSE OF AVERAGE VALUES
     UFGA7901.SBA   PERFORMANCE DATA - AVERAGE VALUES
     UFGA7901.SBT   PERFORMANCE DATA - TIME COURSE OF AVERAGE VALUES
     UFGA8101.SBA   PERFORMANCE DATA - AVERAGE VALUES
     UFGA8101.SBT   PERFORMANCE DATA - TIME COURSE OF AVERAGE VALUES
     UFQU7901.SBA   PERFORMANCE DATA - AVERAGE VALUES
     UFQU7901.SBT   PERFORMANCE DATA - TIME COURSE OF AVERAGE VALUES
F1  - Help                  F4  - Search            F7  - Colour OFF
F2  - Institute Listing     F5  - Sort              F8  - Edit
F3  - Site Listing          F6  - Print             F9  - Remake List
Esc - Quit          L - Include/Exclude In Sublist  F10 - Edit Config File
```

SCREEN 11.

GRAPH

The purposes of the "Graph" utility are to enable the user to graph time series measurements from FILETs and to graph any crop response vs. other crop variables or management inputs that are in FILEAs. Users can select from any of the experiments found in a particular path and then select the type of graph (time series or summary responses) to display. When the type of graph is selected, a list of variables for graphing will be displayed; 1 to 6 variables can be plotted on the same graph. The graph can be saved in a file or printed on a printer, with options available to users for selecting the type of file and type of printer. This graphics program, entitled Wingraf, can also plot simulated and experimental data under the MODELS menu of DSSAT v3, and is described in detail in Volume 2-3 (Chan et al. 1994) of this book.

CONVERT

The purpose of the "Convert" utility is to enable users to convert DSSAT v2.1 crop model input files and crop performance files into DSSAT v3 experiment (FILEX) and crop performance (FILEA and FILET) files, using the program, Convert. The program also enables users to convert weather data, experiment data, and soil data from the old model inputs and outputs described in IBSNAT Technical Report 5 (IBSNAT 1990) into the DSSAT v3 files and formats described in detail in Volume 2-1 (Jones et al. 1994) of this book. The program searches the disk for existing files for all of the crops in DSSAT v2.1 and lists them. Users can then select one or more crops and any one or all of the experiments for each crop to convert. Once the files are converted, the data can be used as inputs to the dif-

ferent model, graphics, and analyses programs available in DSSAT v3. The Convert program and its operation are described in detail in Part 5 of this Volume (Volume 1-5, Imamura & Tang, 1994).

To access the “Genotype” menu option under the DATA main menu item, high-

CHAPTER FIVE.
DATA MENU OPTION: GENOTYPE

light DATA and then press the <G> key or move the highlight bar with the arrow keys to "Genotype" and press the <ENTER> key. The purpose of the "Genotype" menu is to provide access to information on crop cultivars, and on cultivar coefficients for crop models. It also allows users to calculate cultivar coefficients for crop models using their own experimental data, and allows users to access ecotype and species coefficients for crop models, if they are available. In DSSAT v3, these files exist for the grain legume models only. When "Genotype" is accessed, a menu of three options will be presented: "L List/Edit," "A Append" and "C Calculate."

The purpose of the "List/Edit" menu option is to enable users access to data files

LIST / EDIT

in order to search for information on genotypes, based on crop and cultivar names, as well as those based on experiments, institutes, sites and people providing the information.

To open this menu option, press the <L> key or highlight "List/Edit" and press the <ENTER> key. The "List/Edit "program used for genotype data is the same as that used for "Experiment" data (see the section entitled "Experiment" in this chapter). However, it is set up to work only in the C:\DSSAT3\GENOTYPE directory. In addition, it is configured by using the <F10> key to produce a listing of checked files with CUL, SPE and ECO extensions in the file named GENOTYPE.FLE.

The purpose of the "Append" menu option is to enable the user to add a new

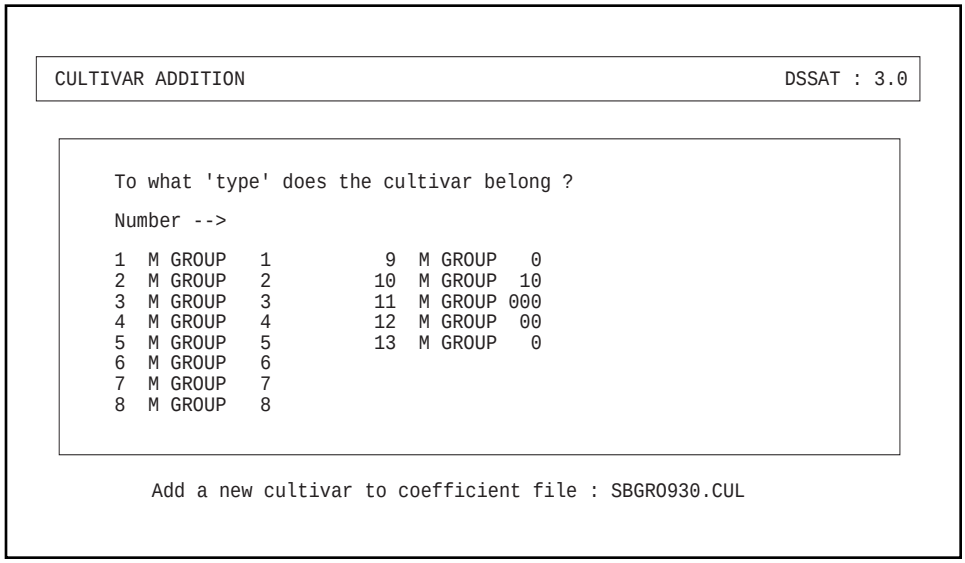
APPEND

cultivar entry into a cultivar coefficient file so that the genetic coefficient calculator program will have starting values when it estimates coefficients from experimental data.

To open this menu option, press the <A> key or highlight "Append" and press the <ENTER> key. A screen will be presented in which you are asked to select a crop. Enter the one-letter code for the crop you are working with.

Enter the cultivar name when the next screen asks for it. Next, enter the Institute ID code (e.g., UF).

The program will then search for other cultivars with this same Institute ID code and check for the first vacant number before assigning the new cultivar a number. It will also determine whether a cultivar with the same name is already in the file. For example, if the cultivar file SBGRO930.CUL has cultivar UF019 in it and UF was entered as an Institute ID code, then the new entry will be labeled UH020.
The next screen presented (Screen 13 above) will display several general culti-



SCREEN 13.

vars, if they were designated as such in the cultivar file by '99' in the institute slots (e.g., 990001 would be general soybean maturity group 1 coefficients.) Enter a number to choose a cultivar "type.". The group types listed in Screen 13 are soybean maturity (M) groups which are photoperiod sensitive and which are stratified by latitude. Thus, the maturity group type number increases as you move away from the equator. You can then type in notes in response to a screen question, and edit the file to confirm that the new cultivar was added with initial values for coefficients. For a more detailed explanation, see Volume 2-2 (Hoogenboom et al. 1994) of this book.

CALCULATE

The purpose of the "Calculate" menu option is to enable the user to calculate cultivar coefficients for different crops. To open this menu option, press the <C> key or highlight "Calculate" and press the <ENTER> key.

When "Calculate" is selected, three options are presented: "I for INDIVIDUAL determinations," "A for AVERAGES calculations" and "Q to QUIT." If "I" is selected, the program adjusts one coefficient at a time, runs the crop model, compares simulated with observed traits, and repeats this process until the differences drop to a low, acceptable level. This process may take some time because the model may be run many times as the program adjusts the different coefficients. Allowable ranges for each coefficient are included in control files for the calculator, and the program stops searching on a particular coefficient if it tries to exceed this range. Note, however, that the actual coefficients vary from crop to crop, and this is taken into account in crop-specific control files that are contained in the system. For a complete description of this program and its operation, see Volume 3-4 (Hunt et al. 1994) of this book.

Select "A" only after determining coefficients for several experiments.

CAUTION: *Before using the "Calculate" program to compute cultivar coefficients, users should create a backup copy of all of their cultivar coefficient files. These files, with CUL extensions, will be found in the GENOTYPE path and should be copied into files of the same prefix name but with a SAV extension. Newly computed cultivar coefficients are written into this file as an option, and contents of the original file could be destroyed.*

CHAPTER SIX.
DATA MENU OPTION: WEATHER

To access the “Weather" menu option under the DATA main menu item, highlight DATA and then press the <W> key or move the highlight bar with the arrow keys to “Weather” and press the <ENTER> key. The purpose of the “Weather” menu is to provide users access to a wide range of weather data management capabilities including searching and sorting for weather stations; editing, printing, re-formatting weather data files; generating daily data; inputting monthly data; analyzing real and simulated weather data; cleaning and filling-in missing observations; and graphing daily weather data and summary statistics. When “Weather” is accessed, a menu of two options will be presented: ”L List/Edit” and “U Utilities.”

LIST / EDIT

The purposes of the "List/Edit” menu option are as follows:

1. Lists all daily weather files in a path with the filename, site name, zone, years (station in place), latitude, longitude, elevation and annual temperature average and amplitude and sequences for each data file. Keeps this list of files in a file named WTHLST.DBF, which is updated, using the <F9> key, after new weather files are added.
2. Provides access to any of the daily weather data files (*.WTH files) using a file editor. Access is with either the user-installed text editor or the editor supplied with DSSAT v3.
3. Allows sorting of the files in order to locate weather for specified filename, site name, zone, years, latitude, longitude, elevation and annual temperature average and amplitudes and sequences. Sorting is performed by placing the cursor in a column to search on and then pressing the <F5> key to initiate the search.
4. Updates the experiment list (WTH.LST) read by the crop models to include new weather data or to reduce the number of weather files that are listed for model simulation. Allows users to toggle any weather file in the list on the screen to be included or excluded form WTH.LST, using the <L> key.
5. Allows users to search in order to locate weather data in the current path based on the filename, site name, zone, years, latitude, longitude, elevation and annual temperature average and amplitude. Use the <F4> key.
6. Allows users access to a global list (WTHLSTG.DBF) of weather data in various paths, using the <F10> key. Allows users to select weather files in other

paths and presents weather files in the path selected in order to maintain the WTH.LST for each path where weather data are contained.

7.) Provides capabilities for users to determine what daily generated weather data files are available.

8. Climate files (.CLI files) contain general site information as well as long-term monthly means of daily weather variables. These data are used to generate daily weather data when actual daily data are not available for a site. A climate data list manager provides capabilities for users to determine what climate data files are available, to view and edit them, to search for climates with certain characteristics, and to maintain a list of available sites for use by the crop models and weather generator. .

To open the "List/Edit" menu option, press the <L> key or highlight "List/Edit" and press the <ENTER> key. Screen 14 (below) will be presented, displaying the global list of weather files with filename, site name, zone, years, latitude, longitude, elevation and annual temperature average and amplitude and sequences. Since all the columns do not fit on one screen, use the arrow keys to scroll left and right through the columns.

```
Weather File Manager (WFM)                                    Version 3.0
                  - Files In All Installed Directories -
 FILENAME       SITE NAME                ZONE    YR    LAT      LONG      ELEV
 CCPA8601.WTH   CIAT,PALMIRA,COLOMBI     XXX     -9      3.5     -76.4     -99
 CCPA8601.WTH   CIAT,PALMIRA,COLOMBI     XXX     -9      3.5     -76.4     -99
 DTSP8501.WTH   SUPHEN_BURI,THAILAND     XXX     -9     14.5     100.1     -99
 EBGO8701.WTH   CNPAF,GOIANIA,BRAZIL     XXX      0    -16.3     -49.1     -99
 FLSC8101.WTH   FLORENCE,SOUTH_CAROL     XXX     -9     34.0       0.0       0
 GABL.CLI       ESTIMATED_FROM_DAILY     XXX      0     33.2     -84.4       0
 GABL.WTD                                         0      4.5       9.4       2
 GABL8701.WTH   BLEDSOEFARM,WILLIAMS     XXX     -9     33.2     -84.4       0
 GABL8801.WTH   BLEDSOEFARM,WILLIAMS     XXX     -9     33.2     -84.4       0
 GABL8901.WTH   BLEDSOEFARM,WILLIAMS     XXX     -9     33.2     -84.4       0
 GABL9001.WTH   BLEDSOEFARM,WILLIAMS     XXX      0     33.2     -84.4       0
 GABL9101.WTH   BLEDSOEFARM,WILLIAMS     XXX     -9     33.2     -84.4       0
F1  - Help                    F4  - Search              F7  - Colour OFF
F2  - Institute Listing       F5  - Sort                F8  - Edit
F3  - Site Listing            F6  - Print               F9  - Remake List
Esc - Quit            L - Include/Exclude In Sublist    F10 - Database List
```

SCREEN 14.

The FILENAME is the name of the weather file, using the DSSAT v3 file naming convention. The SITE NAME is the name of the weather station site. ZONE can

be any weather classification system the user wishes to use. YR is the number of years of weather data for that site. LAT and LONG and ELEV, are latitude, longitude and elevation respectively, and describe the location of the weather station. TAV is the annual average temperature. TAMP is the annual average amplitude. SEQUENCES is listed so the user can enter weather sequence numbers for that site if desired; for example, 84001-87365. ZONE, YEARS and SEQUENCES are not required data. The general functions for searching, sending, printing and editing are similar to the other data operations described in Chapter 3, as are the <F9>, <F10> and <L> keys, which are described under “List/Edit” in Chapter 4.

The Database List shown in Screen 14 includes files in all directories identified with a WTH or CLI extension ; in other words, it is a global listing. The DSSATLST.FLE is found in the C:\DSSAT3 directory and can be edited by any text editor to add new paths. If the file is edited, you must press the <F9> key to re-build the global experiment list. After editing this file, you must press the <F9> key to re-build the global experiment list. The Working List displays a list of weather files in the working directory. The working directory can be changed by moving the highlight bar over a particular soil and pressing <F10>. The program will then transfer to the directory containing that file and list all weather files in that directory. You can go back to the global list by pressing <F10> again.

UTILITIES

The purpose of the "Utilities" menu option is to enable users to reformat ASCII weather data files, fill missing data, generate weather data, compute statistics on daily weather data, and graph data. The weather manager program is called WeatherMan (WM.EXE) and a detailed description of its capabilities and its operation can be found in Volume 3-3 (Hansen et al. 1994) of this book. The program functions both with a mouse or the keyboard; however, the use of a mouse is recommended. WeatherMan was designed to run under DSSAT v3 or to run standalone.

To open the “Utilities” menu option, press the <U> key or highlight “Utilities” and press the <ENTER> key. The WeatherMan program will open , displaying the WeatherMan main menu options, described below.

FILE

Provide access to an editor from within WeatherMan, go to DOS shell, access general information about WeatherMan, and exit the program.

STATION

Select a station name, enter/edit station information and monthly mean weather data manually, or compute monthly means from previously archived daily data files for the station. The station name is used to locate all daily, climate, generated and archived data files. Selection of a station is required for most operations, but it is not required for a quick Convert Format.

IMPORT/EXPORT

Convert. The "Convert" menu option allows users to quickly convert weather data files by naming the file to be converted, specifying its format, naming the new file and specifying the final format. Format specification can be done by selecting the name of a previously defined format, such as IBSNAT2 or IBSNAT3 or a previously user-defined name or by building a new format interactively. Data are assumed to be in column format for this version. A file viewer is provided to assist in building the format..

Import. The "Import" menu item is similar to "Convert," but it allow users to save data into an ASCII archive file, named ssss.WTD, where "ssss" is the weather station code. Imported data will be added to data already in the archive file. On "Import," data can be checked and flagged for erroneous characters, missing data, missing dates, out of range data, and data that change too rapidly from one day to the next. The flags are defined in WeatherMan (Volume 3-4, Hansen et al. 1994, of this book) and in Appendix D of Volume 2-1 (Jones et al. 1994).

Export. The "Export" menu option enables users to export data from the station archive file by specifying a format and naming an export file. The default format and file naming convention are those defined in Volume 2-1 (Jones et al. 1994) of this book. Options under this section allow users to determine whether data errors and missing data will be filled, and if so, whether running averages, monthly averages or generated daily values will be used.

GENERATE

With the "Generate" menu option, weather coefficients can be calculated from daily weather data stored in the archive (WTD) files and daily weather data generated. Daily weather can be generated using the WGEN (Richardson and Wright, 1984) model which requires coefficients computed from daily data, or the SIMMETEO model (Geng et al., 1986; Geng and Auburn, 1988) which operates using long-term monthly averages. Generated data are stored in temporary archive files, named ssss_GEN.WTD, for further analysis. Generated data can

then be exported to yearly files, such as those defined for DSSAT v3, or to a single file.

Analyze

With the "Analyze" menu item, users can select from several types of statistics that can be computed for the data contained in any existing archive file. Statistics can be printed or viewed under the "Report" menu item. A graphics program (WMGRAF.EXE) is included to display daily data or statistics, and the graphs can be printed or written to a file. Comparisons between original data and generated data and between sites are also possible. Note that only time series graphs are available for DSSAT v3.

Options

With the "Options" menu item, users can change the directories used by the WeatherMan program, change the display mode and colors, specify the format for graphs, and select graph output options. Any changes made can be saved to a configuration file. Users can also enable or disable access to DSSAT v3 directory information for stand-alone operation. See Volume 3-3 (Hansen et al. 1994) of this book for a detailed description of WeatherMan.

CHAPTER SEVEN.
DATA MENU OPTION: SOIL

To access the “Soil" menu option under the DATA main menu item, highlight DATA and then press the <S> key or move the highlight bar with the arrow keys to “Soil” and press the <ENTER> key. The purpose of the “Soil" menu is to provide users access to all soil data in DSSAT v3. In DSSAT v3, soil data for models can be stored in a file named SOIL.SOL, or they may be stored in other files, such as UF.SOL, which designates the institute code for organizing a set of soils. Users can search on soils by name, description, texture, and depth as well as site, country, and latitude and longitude of the soil sample. Functions to sort, print, and select files for editing are made available. Graphs of selected soil attributes vs. depth can be viewed.

Another major function of this menu option is to allow users to create new soils for running the crop models in three ways: 1) by entering soil data interactively with a program which will compute the soil parameters for the *.SOL files; 2) by accessing a large data base of soil characteristic data and selecting a soil similar to the one at a site; and 3) by using a text editor to enter the soil parameters directly, based on the file formats given in Volume 2-1 (Jones et al. 1994) of this book.

When “Soil” is accessed, a menu of three options will be presented: ”L List/Edit,” “C Create” and “U Utilities.”

LIST / EDIT

The purposes of the “List/Edit" menu option are as follows.

1. Lists all soils from all *.SOL files in a path. The columns on the screen display the soil file name, soil code, texture, depth, description, site, country, latitude, longitude, data source, and classification. Horizontal scrolling allows one to view all columns while keeping the code on the screen. This list of files is kept in a file named SOLLST.DBF, which is updated after new experiments are added using the <F9> key.
2. Provides access to any of the soils in any of the soil files using a file editor. Access is with either the user-installed text editor or the editor supplied with DSSAT v3.
3. Allows sorting in order to locate soils based on any of the information in the

columns. To sort, place the cursor in a column and then press the <F5> to initiate the sort.

4. Creates a list of selected soils (SOL.LST) for use by the crop models by allowing the user to include new soils or to reduce the number of soils that are listed for model simulation. Use the <L> key to toggle-check any soil in the list for inclusion in or exclusion from the SOL.LST file.
5. Allows users to search and locate soils in the current path based on soil code, texture, depth, description, site, country, latitude, longitude, data source, and classification. Use the <F4> key.
6. Allows users access to a global list (SOLLSTG.DBF) of soils for various paths on the computer, using the <F10> key. Allows users to select soil files in other paths and presents files in the paths selected in order to maintain the SOL.LST.

To open the “List/Edit" menu option, press the <L> key or highlight “List/Edit” and press the <ENTER> key. Screen 16 (below) will be presented, displaying the global list of soils with soil code, texture, depth, description, site, country, latitude, longitude, data source and taxonomy.

```
Soil File Manager (SFM)                                        Version 3.0

                    - Files In Directory: C:\DSSAT3\SOIL -

  L   SOIL CODE    TEXTUR   DEP   DESCRIPTION
 ---  ------------ -------  ----  ---------------------------
  √   99WH000001   SICY     210   DEFAULT - DEEP SILTY CLAY
  √   99WH000002   SICY     150   DEFAULT - MEDIUM SITLY CLAY
  √   99WH000003   SICY     60    DEFAULT - SHALLOW SILTY CLAY
  √   99WH000004   SILO     210   DEFAULT - DEEPT SILTY LOAM
  √   99WH000005   SILO     150   DEFAULT - MEDIUM SILTY LOAM
  √   99WH000006   SILO     60    DEFAULT - SHALLOW SILTY LOAM
  √   99WH000007   SALO     210   DEFAULT - DEEP SANDY LOAM
      99WH000008   SALO     150   DEFAULT - MEDIUM SANDY LOAM
      99WH000009   SALO     60    DEFAULT - SHALLOW SANDY LOAM
      99WH000010   SA       210   DEFAULT - DEEP SAND
      99WH000011   SA       150   DEFAULT - MEDIUM SAND
      99WH000012   SA       60    DEFAULT - SHALLOW SAND

F1  - Help                    F4  - Search            F7  - Colour OFF
F2  - Institute Listing       F5  - Sort              F8  - Edit
F3  - Site Listing            F6  - Print             F9  - Remake List
Esc - Quit            L  - Include/Exclude In Sublist   F10 - Database List
```

SCREEN 16.

The SOIL CODE is a 10-character identifier for the particular soil. The first two letters are the institute ID code. The next 8 characters could be whatever the user chooses, but it is recommended that the next two characters be the site ID code; characters 5 and 6, the year; characters 7 and 8, an institute ID code if the assign-

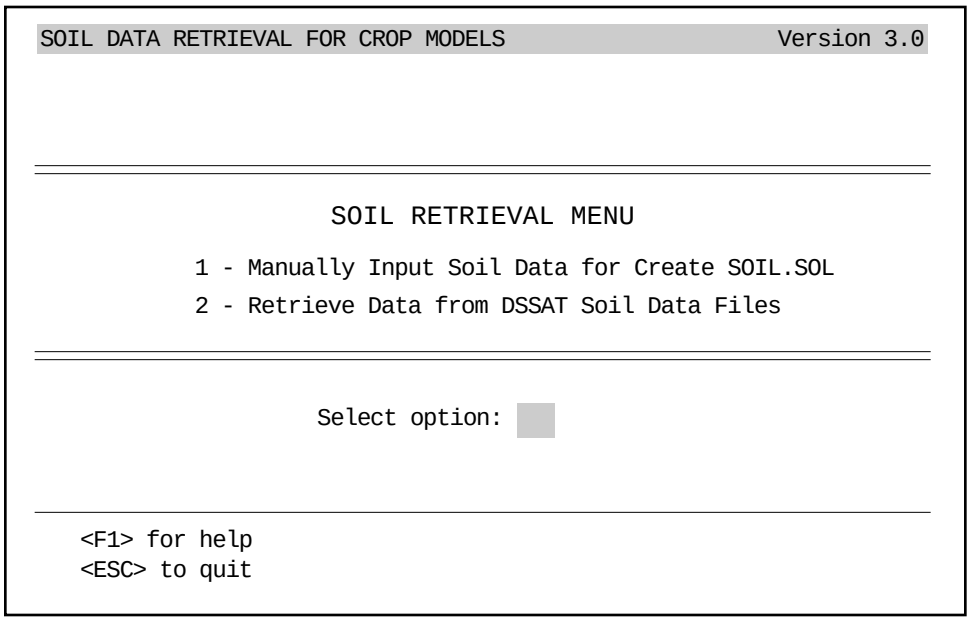
ing institute differs from that denoted with characters 1 and 2, and the last two characters, a number for identification. A '99' as the first two characters of the soil code indicates that the institute ID code for that soil is not known or has not been entered. TEXTUR is for texture codes, which are found in Appendix B in Volume 2-1 (Jones et al. 1994) of this book. DEP is soil depth in cm. The DESCRIPTION is the full description of the soil texture. SITE is the name of the soil site. COUNTRY, LATITUDE, LONGITUDE and DATA SOURCE are self-explanatory. TAXONOMY is the soil's taxonomy classification. The g eneral functions for searching, sending, printing and editing are similar to the other data operations already described in Chapter 3, as are the <F9>, <F10> and <L> keys, described in Chapter 4.

The Database List includes soil files in all directories identified with a SOL extension; in other word, it is a global listing. This file is similar to the file DSSATPRO.FLE, but it contains pointers to any path on your computer that has experimental data. DSSATLST.FLE is in the C:\DSSAT3 directory and can be edited by any text editor to add new paths. After editing this file, you must press <F9> to re-build the global experiment list. The Working List displays a list of soils in the working directory. The working directory can be changed by moving the highlight bar over a particular soil and pressing <F10>. The program will then transfer to the directory containing that soil file and list all soil files in that directory. You can go back to the global list by pressing <F10> again.

CREATE

The purpose of the "Create" menu option is to enable users to create new soil profile data for the crop models, with a Soil Retrieval program. With this program, users can either manually imput soil data to create a new soil profile or retrieve data from soil data files distributed with DSSAT v3.

To open this menu option, press the <C> key or highlight "Create" and press the <ENTER> key. Screen 17 (on the following page) will be presented.



SCREEN 17.

The Soil Retrieval menu presents two options. Select Option 1 to manually input soil data and create a SOIL.SOL file. Follow the instructions in the section entitled, "Manually-Entered Soil Data," in this Chapter

Select Option 2 to retrieve soil data from the USDA-SCS that was also included in DSSAT v2.1. Follow the instructions in the following section entitled, "Retrieve Soil Information."

RETRIEVE SOIL INFORMATION

When Option 2 of the Soil Data Retrieval menu is selected, Screen 18 (below) will be presented.

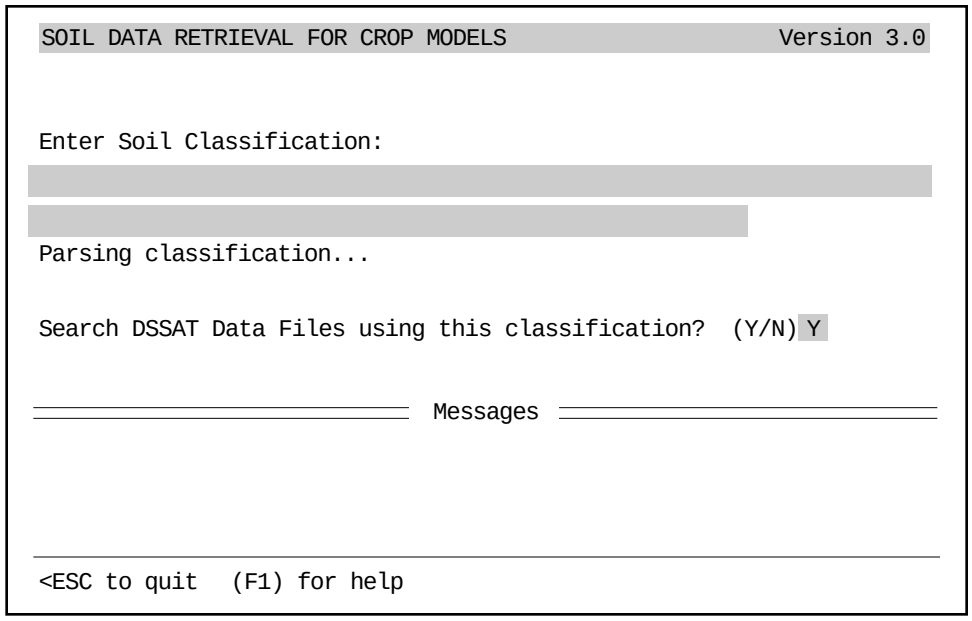
```
SOIL DATA RETRIEVAL FOR CROP MODELS                    Version 3.0




        1 - Search for closest matching soil classification
        2 - Search for a particular country
        3 - Select a particular Pedon Number

        Select option:




<ESC to quit  (F1) for help
```

SCREEN 18.

To search for the closest matching soil classification. Choose Option 1 in Screen 18. Turn to the section entitled, "Option 1: Search by Soil Classification," in this Chapter.

To search for soils from a particular country. Choose Option 2 in Screen 18. Turn to the section entitled, "Option 2: Search by Country," in this chapter.

To select a soil by pedon number. Choose Option 3 in Screen 18. See the following section entitled, "Option 3: Select by Pedon Number," in this Chapter.



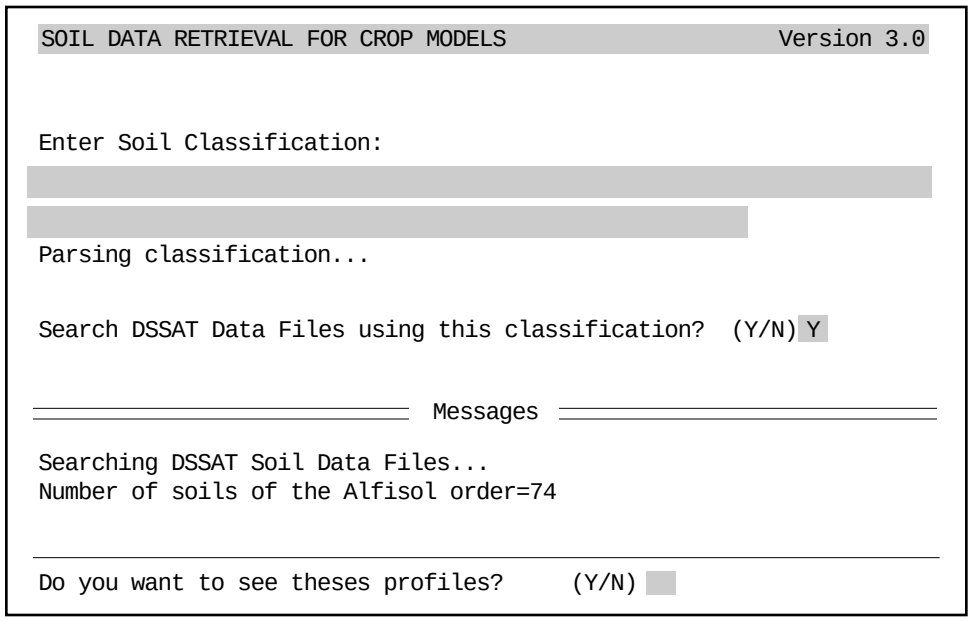
SCREEN 19.

OPTION 1: SEARCH BY SOIL CLASSIFICATION

Screen 19 (above) is displayed if Option 1, "Search for closest matching soil classification," in Screen 18 is selected. The soil classification entered here is used as the initial description of search classification. Make any changes by typing your description over the classification displayed on the screen. Press the <ENTER> key when you have finished making changes to the search classification.

***NOTE**: The soil classification search uses terminology associated with Soil Taxonomy (Soil Survey Staff 1975).*

Type "Y" to search the soil data files by soil classification.; type "N" to enter a different soil classification.



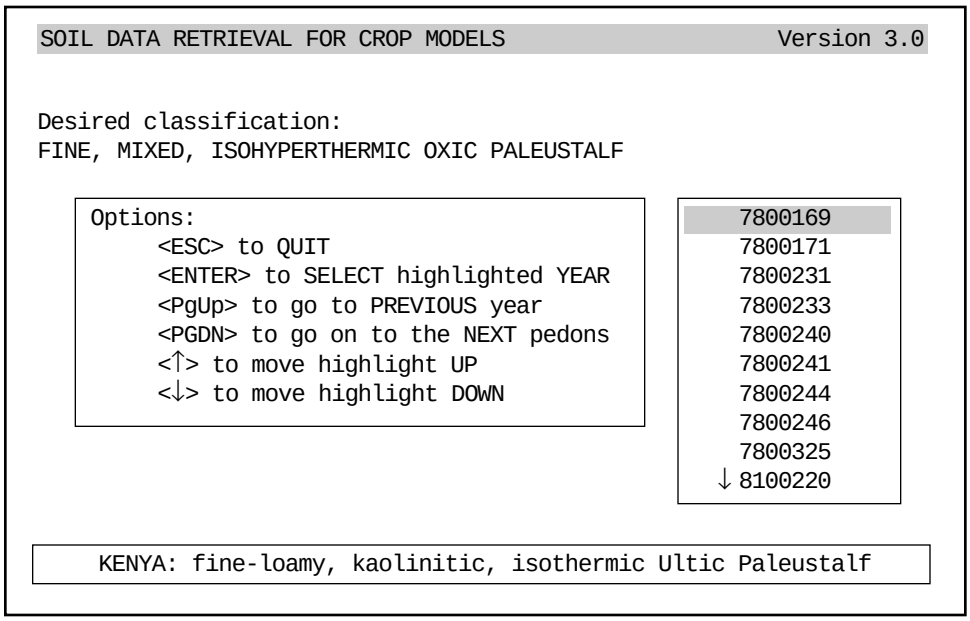
SCREEN 20.

Searching the Data Files. The program searches by soil classification using a process of elimination. This process begins by matching the soil Order (e.g., Alfisols) found in the soil classification box in Screen 20 (above) with those pedons in the DSSAT soil data files having the same soil Order.

To see a listing of the remaining soil profiles, type "Y;" otherwise, type "N" and the search will continue.

The program continues matching profiles using the following criteria in the order given: Suborder, Great group, Subgroup modifiers and soil Family modifiers, texture, mineralogy, reaction and temperature regime. At each step of the elimination process, type "Y" to view the remaining profiles. When 32 or less profiles remain, you may stop the elimination process at any time. At the prompt, type "Y" to continue the elimination process with the next search criteria; type "N" if you do not want to continue the elimination process.

NOTE: *The program will terminate its search if the next step of the process eliminates all of the remaining profiles.*



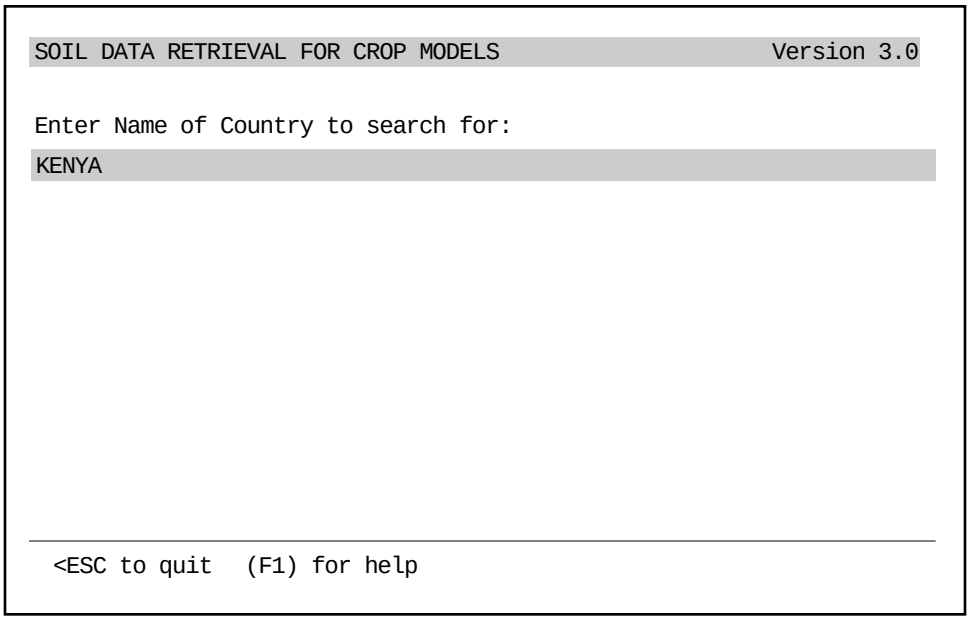
SCREEN 21.

`Selecting a Pedon Number.` When all matching profiles have been found, their pedon numbers are displayed as shown on Screen 21 (above). The boxed window at the bottom of the screen will display the country and classification of the soil associated with the selected (highlighted) pedon number.

Use the arrow keys to move the highlight bar over a pedon number. Press the <ENTER> key once the pedon number of the profile you wish to retrieve is highlighted.

NOTE: *If the country name is missing or the classification is unknown, this is probably because the profile record has a blank country-code field or is missing data in all of the classification code fields.*

Go to the section entitled, "Complete the Retrieval" in this chapter.



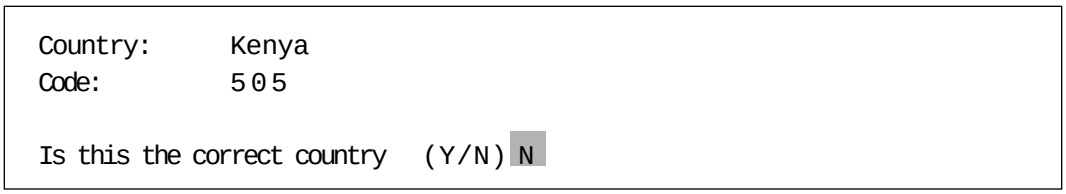
SCREEN 22.

OPTION 2: SEARCH BY COUNTRY

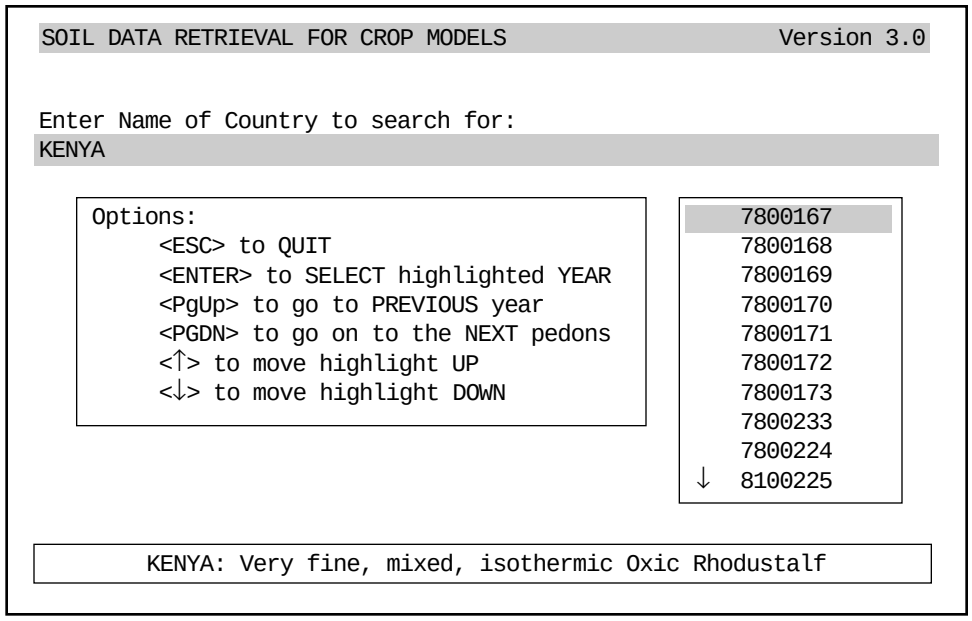
If you choose Option 2 in Screen 18, " Search for a particular country," Screen 22 (above) will be displayed. Enter the name of the country for which you want soil data retrieved.

NOTE: *You may enter a partial country name if you do not know the complete country name.*

`Validating Country Name.` After the country name is entered, the program searches its country-code file to determine if the name is valid. If the country name that you entered is a close match to a country listed in the country-code file, the program will display the message shown in the following dialog box. For exact matches, the program will not display this dialog box.



If the located country is correct, type the 'Y' key. If it is not correct, type 'N', and the program will search for the next possible match and prompt you again.



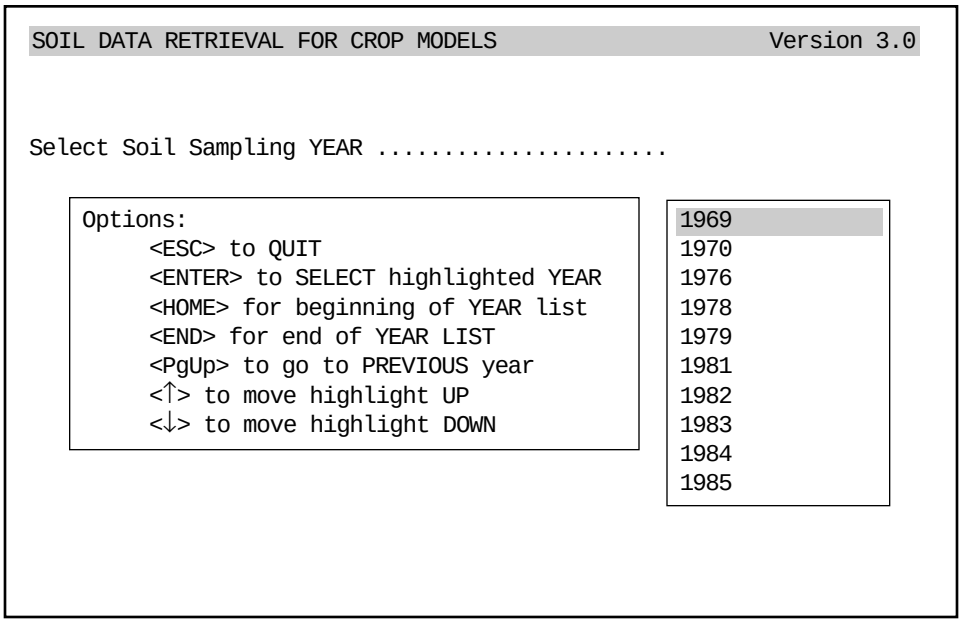
SCREEN 23.

`Selecting a Pedon Number.` When the search is completed, the first soil profile from the specified country is displayed as well as all pedon number for that country, as shown on Screen 25 (above). The boxed window at the bottom of the screen will display the country and classification of the soil associated with the selected (highlighted) pedon number.

Use the arrow keys to move the highlight bar over a pedon number. Press the <ENTER> key once the pedon number of the profile you wish to retrieve is highlighted.

NOTE: *If the classification is unknown, this is probably because the profile record is missing data in all of the classification code fields.*

Go to the section entitled, "Complete Retrieval" in this chapter.



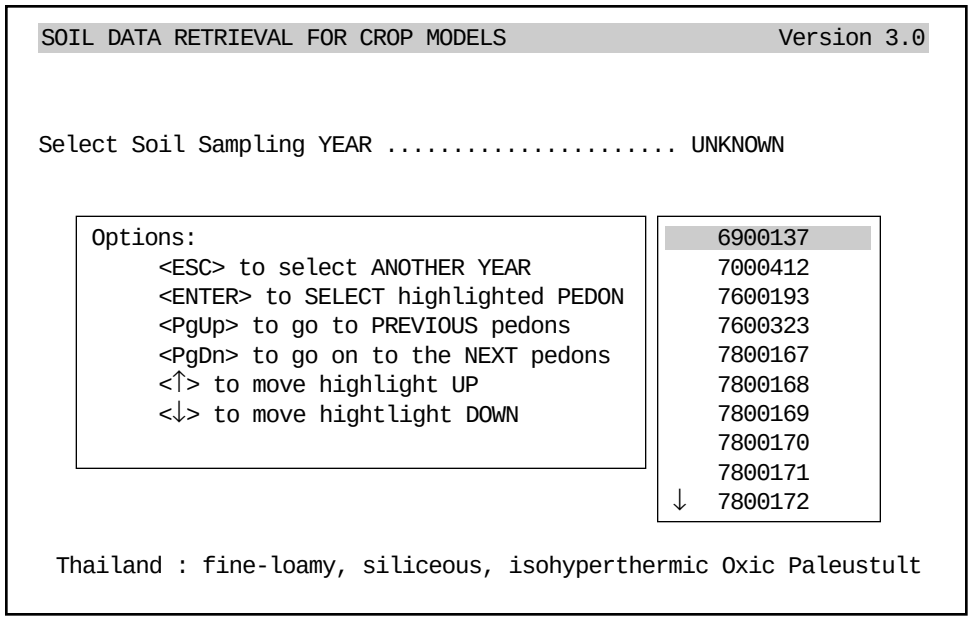
SCREEN 24.

OPTION 3: SELECT BY PEDON NUMBER

If you choose Option 3 in Screen 18, "Select a particular Pedon Number," Screen 24 (above) will be presented. You must now manually select the soil information you wish to retrieve from the data files to run the crop models.

1. Press the <ESC> key if you wish to return to Screen 18.

2. To select a soil profile, use the arrow keys to select the year that the soil was sampled or select UNKNOWN if you do not know the sampling year. "UNKNOWN" will be found at the bottom of the year listing.



SCREEN 25.

Selecting a Pedon Number. After selecting the year of sampling, the pedon numbers of all profiles sampled during that year are displayed in the right-hand boxed window of Screen 25 (above). The boxed window at the bottom of the screen displays the country and classification of the soil associated with the selected (highlighted) pedon number.

Use the arrow keys to move the highlight bar over a pedon number. Press the <ENTER> key once the pedon number of the profile you wish to retrieve is highlighted.

NOTE: *If the country name is missing or the classification is unknown, this is probably because the profile record has a blank country-code field or is missing data in all of the classification code fields.*

Go to the section entitled, "Complete the Retrieval," in this Chapter.

```
SOIL DATA RETRIEVAL FOR CROP MODELS                    Version 3.0

Retrieving...

Country    :     KENYA
Latitute   :     Missing
Longitude  :     Missing
Pedon No.  :     7800167
Name       :     very fine, mixed, isothermic Oxic Rhodustalf

Exiting Retrieval...

                          Messages

*** WARNING - Top layer soil color is blank

Process Successfully Completed...
```

SCREEN 26.

COMPLETE THE RETRIEVAL

During profile retrieval, warning and/or error messages are generated and displayed at the bottom of the screen in the message area, as shown in Screen 26 (above).

Although warning and error messages may occur during retrieval processing, the program will still produce a soil output file. The resulting output file will contain whatever valid information was contained in the selected soil profile from the DSSAT soil data files, and this file may be used to create a SOIL.SOL.

Go to the section entitled, "Create a Soil Profile," in this Chapter for an explanation of how to use the retrieved data to create the model input file SOIL.SOL.

MANUALLY-ENTERED SOIL DATA

This section explains how to create a soil profile by manually entering a data. If you are using this entry procedure (i.e., selected Option 1 from the Soil Data Retrieval menu), it is assumed that you have soil profile information in hard-copy format and want to manually enter the data from the keyboard.

Type 'Y' when the first screen appears if you have this data at hand; otherwise, type 'N' to end the program.

SOIL DATA INPUT GUIDELINES

The following guidelines may be helpful during manual soil information data entry.

1. In each of the input screens that follow, you may press the <ESC> key before entering data to abort the manual input process. If you quit before completing the manual input process, any data already entered will not be saved, and you will be given the option of starting over and creating a new soil profile.

2. The program allows you to correct data input errors after data entry for a section is completed, but **not** during data entry.

For example, if you enter an incorrect value (e.g., '3.2') for the pH value of layer 3, complete data entry for the pH values of the rest of the layers and when the program prompts with:

"Are these values OK? (Y/N)"

type 'N' and press the <ENTER> key. The program will prompt with:

"Enter layer number of value you wish to change (0 for ALL)"

Type in the layer number ('3' in our example for pH) or '0' if you wish to change all the values entered, enter the correct value(s), and press the <ENTER> key.

3. After error checking the input data, the program will display current input data that will be used in the calculations. The program will then prompt you with:

"Do you want to make changes to input data?" (Y/N)

If you discover that there are some errors and you wish to change any of all of the input data, type 'Y' and press the <ENTER> key. Otherwise, type 'N' and press the <ENTER> key to begin calculations.

```
SOIL DATA RETRIEVAL FOR CROP MODELS                          Version 3.0

Input Data used to create SOIL.SOL:

INPUT                                          VARIABLE(S) CALCULATED
Lower/Upper depths for each layer (cm)                          SWCON2, WR
% Sand                                          LL, DUL, SAT, SALB, U
% Clay                                          LL, DUL, SAT, SALB, U
% Silt                                          LL, DUL, SAT, SALB, U
Bulk Dens. 1/3 bar (g/cm3)                   LL, DUL, SAT, SWCON, WR
Organic carbon                                    LL, DUL, SAT, SALB
Coarse fraction >2 mm, % of whole soil                 LL, DUL, SAT
pH-H20 of soil                                                   WR
Al saturation (cm3/cm3)                                          WR
Soil Classification                                             CN2
Soil horizons                                                   CN2
Root abundance information                                       WR
Slope                                                           CN2
Soil Color                                                     SALB
Pemeability code                                                CN2
Drainage code                                                 SWCON

Press any key to continue
```

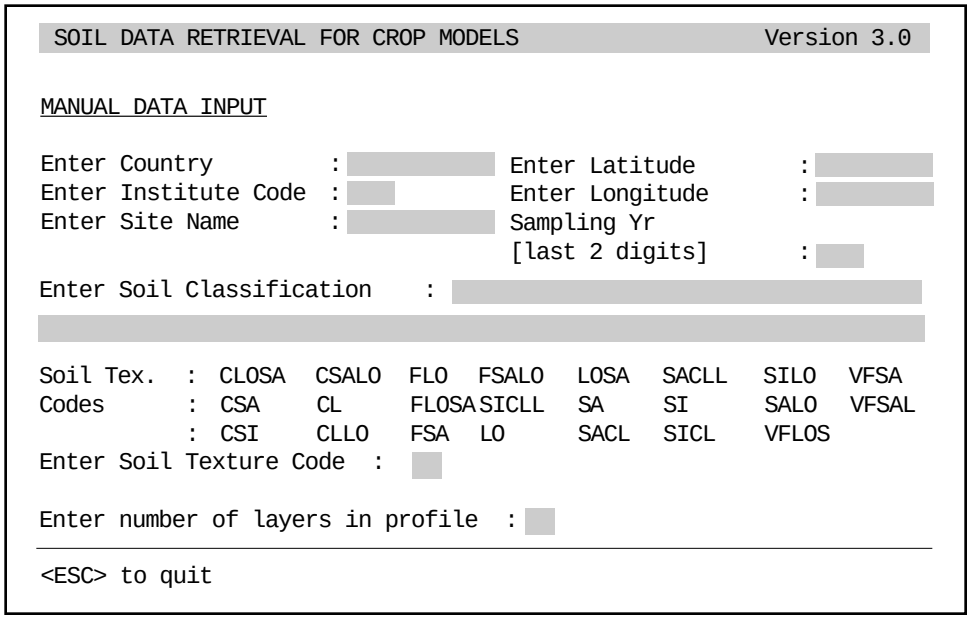
SCREEN 27.

INPUT/CALCULATED VARIABLES

Screen 27 (above) specifies the input data (left-hand column) the program requires to correctly calculate the given variables listed in the right-hand column. You may enter default values for any missing input data values. If you enter default values, however, the resulting calculated output values may not be correct.

SELECT CROP CODE

After checking the required data in Screen 27 and making sure you have these data, the next screen presented after pressing any key to continue will ask you to enter a crop code from those listed on the screen. Enter a code to continue or press the <ESC> key to return to Screen 18. If you continue, Screen 28 (on the following page) will be presented.



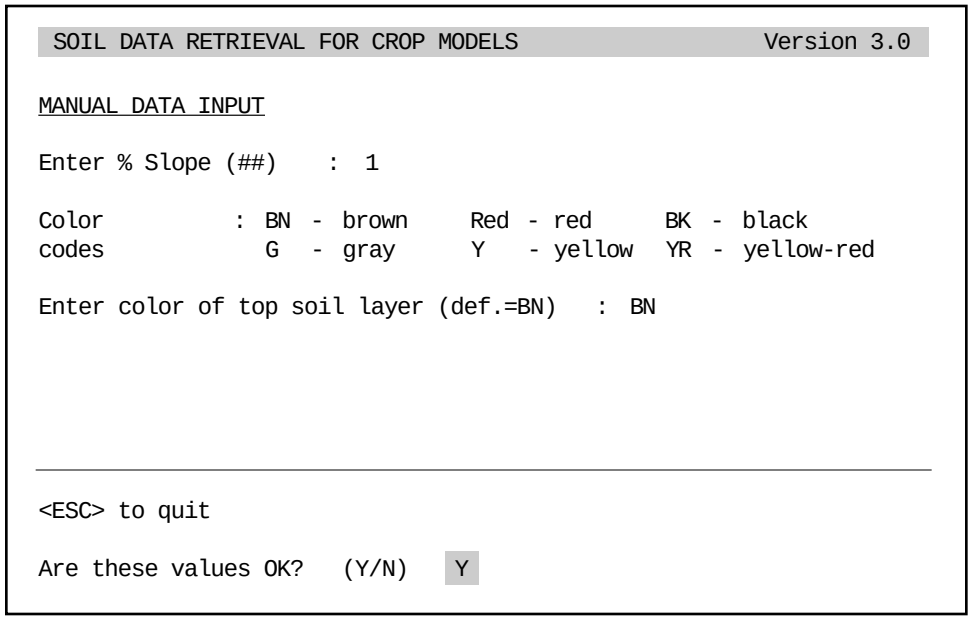
SCREEN 28.

SOIL PROFILE INPUT DATA

After you enter the crop code, Screen 28 (above) will be presented. Enter name of country, institute code, site name, latitude and longitude of site.

Enter the soil name or classification, texture, and the number of layers in the profile.

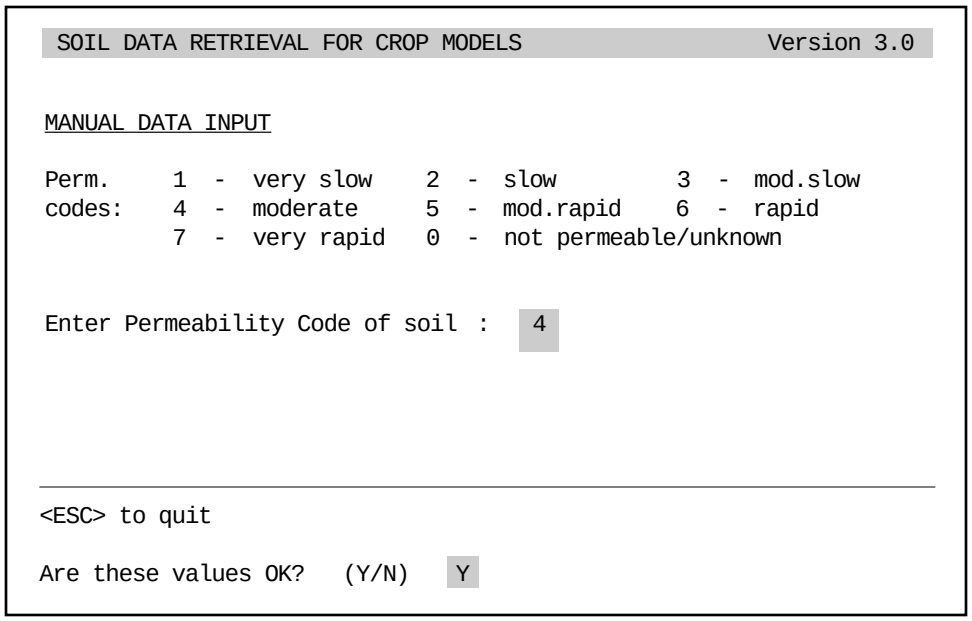
NOTE: *For a explanation of soil texture codes, see Appendix B in Volume 2-1 (Jones et al. 1994) of this book.*



SCREEN 29.

SLOPE AND COLOR

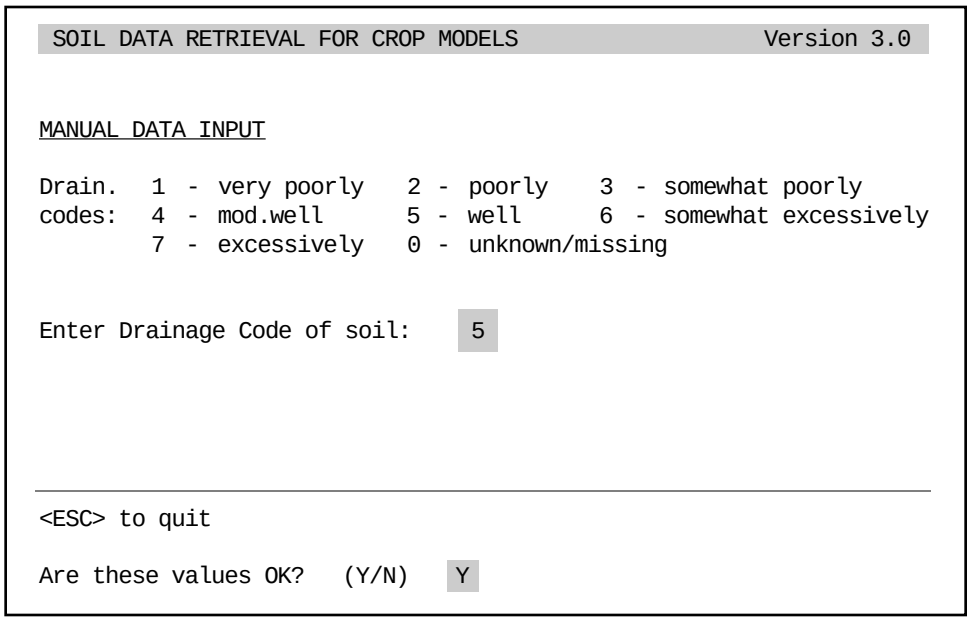
In Screen 29 (above), enter slope and soil color. For slope, enter a percentage between 0 and 99. For color information, enter the code letters corresponding to the color of the top layer of the soil.



SCREEN 30.

PERMEABILITY

In Screen 30 (above) enter the code number corresponding to the permeability class of the soil (e.g., enter '4' for "moderate").



SCREEN 31.

DRAINAGE

In Screen 31 (above), enter the code number corresponding to the drainage class of the soil (e.g., enter '5' for "well").

```
 SOIL DATA RETRIEVAL FOR CROP MODELS                    Version 3.0


MANUAL DATA INPUT

Enter Thickness (cm) of layer # 1 (###) :  13
Enter Thickness (cm) of layer # 2 (###) :  17
Enter Thickness (cm) of layer # 3 (###) :  32
Enter Thickness (cm) of layer # 4 (###) :  22
Enter Thickness (cm) of layer # 5 (###) :  16
Enter Thickness (cm) of layer # 6 (###) :  40
Enter Thickness (cm) of layer # 7 (###) :  40




<ESC> to quit
```

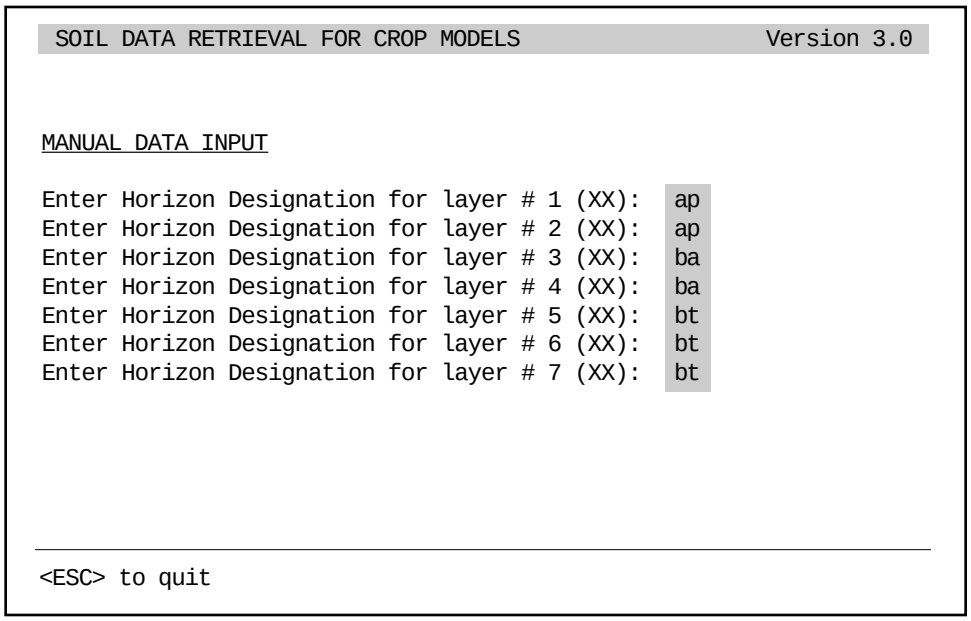
SCREEN 32.

SOIL LAYER DEPTHS

In Screen 32 (above), enter the thickness, in cm., of each layer. With this information, the program calculates the upper and lower depths associated with each soil layer. Sample values are displayed in the above screen. Using these sample values, the program would display a screen listing the layer thickness as follows:

Layer	#1:	0	-	13	cm
Layer	2:	13	-	30	cm
Layer	3:	30	-	62	cm
Layer	4:	62	-	84	cm
Layer	5:	84	-	100	cm
Layer	6:	100	-	140	cm
Layer	7:	140	-	180	cm

NOTE: *For the layer thickness, you must re-enter all of the values if you wish to change any one of them.*



SCREEN 33.

SOIL HORIZONS

In Screen 33 (above), enter the soil horizons associated with each layer. Enter only the first two characters of the horizon designation.

CLAY CONTENT

The clay content screen is similar to that of Screen 33 for Soil Horizons. Enter the percentage clay contentr, from 0 to 100, for each soil layer.

SILT CONTENT

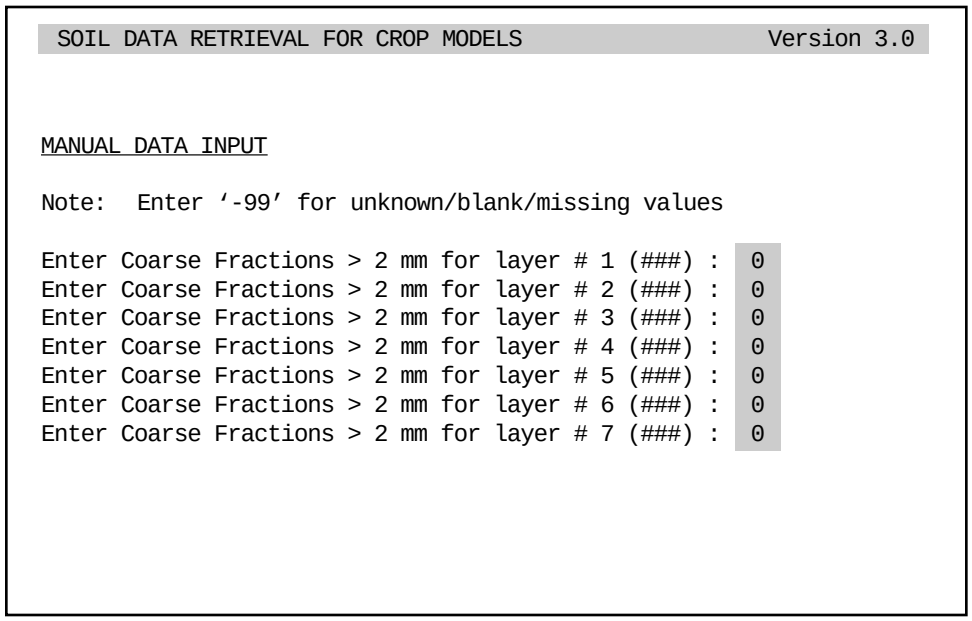
The silt content screen is similar to that of Screen 33 for Soil Horizons. Enter the percentage silt content, from 0 to 100, for each soil layer.

```
 SOIL DATA RETRIEVAL FOR CROP MODELS                    Version 3.0


MANUAL DATA INPUT

                 % Clay          % Silt          % Sand
Layer 1            3.2            18.9            77.9
Layer 2            8.5            14.1            77.4
Layer 3           10.5            16.1            73.4
Layer 4            8.9            17.5            73.6
Layer 5           12.5            17.0            70.5
Layer 6           12.6            18.5            68.9
Layer 7           14.5            16.2            69.3


 Press any key to continue
 ------------------------------------------------------------------------
<ESC> to quit
```

SCREEN 34.

SAND CONTENT

In Screen 34 (above), the program will compute the percentage sand content for each soil layer from the clay and silt values entered. (It assumes that all three components sum to 100 percent.)



SCREEN 35.

COARSE FRACTIONS

In Screen 35 (above), enter the volume fraction percentage, from 0 to 100 of gravel, cobbles and stones for each layer.

ORGANIC CARBON

The organic carbon screen is similar to that of Screen 35 for Coarse Fractions. Enter the organic carbon content percentage, from 0 to 100, for each soil layer.

BULK DENTISY

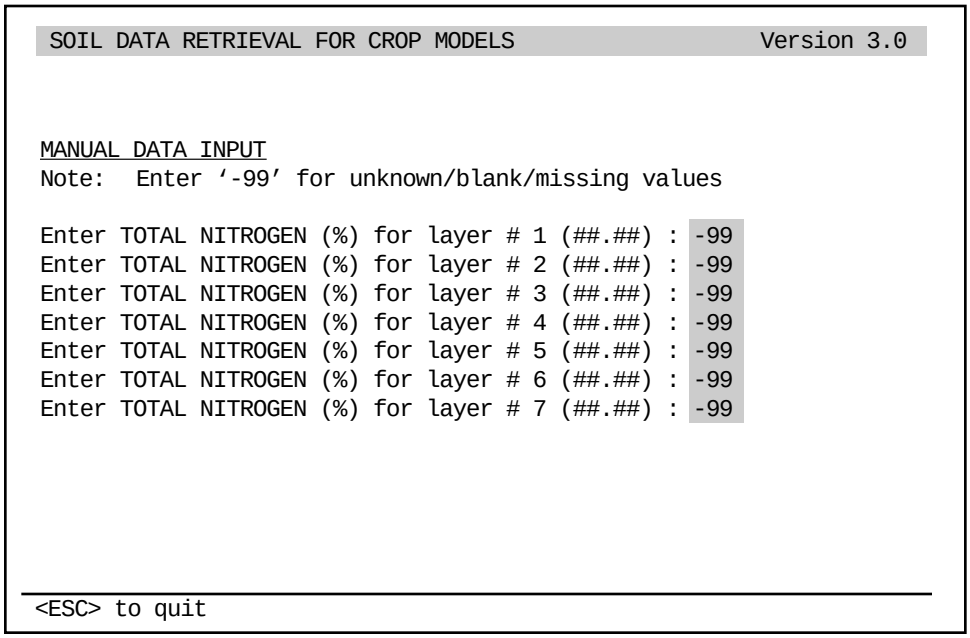
The bulk density screen is similar to that of Screen 35 for Coarse Fractions. Enter the bulk density, as g/cm^3, for each soil layer.

```
SOIL DATA RETRIEVAL FOR CROP MODELS                    Version 3.0


MANUAL DATA INPUT
Note:  Enter '-99' for unknown/blank/missing values

Enter Sat. Hydraulic Cond.(cm/h) for layer # 1 (###.#) : -99
Enter Sat. Hydraulic Cond.(cm/h) for layer # 2 (###.#) : -99
Enter Sat. Hydraulic Cond.(cm/h) for layer # 3 (###.#) : -99
Enter Sat. Hydraulic Cond.(cm/h) for layer # 4 (###.#) : -99
Enter Sat. Hydraulic Cond.(cm/h) for layer # 5 (###.#) : -99
Enter Sat. Hydraulic Cond.(cm/h) for layer # 6 (###.#) : -99
Enter Sat. Hydraulic Cond.(cm/h) for layer # 7 (###.#) : -99




<ESC> to quit
```

SCREEN 36.

SATURATED HYDRAULIC CONDUCTIVITY

In Screen 36 (above), enter the saturated hydraulic conductivity as cm/h, for each soil layer.



SCREEN 37.

TOTAL NITROGEN

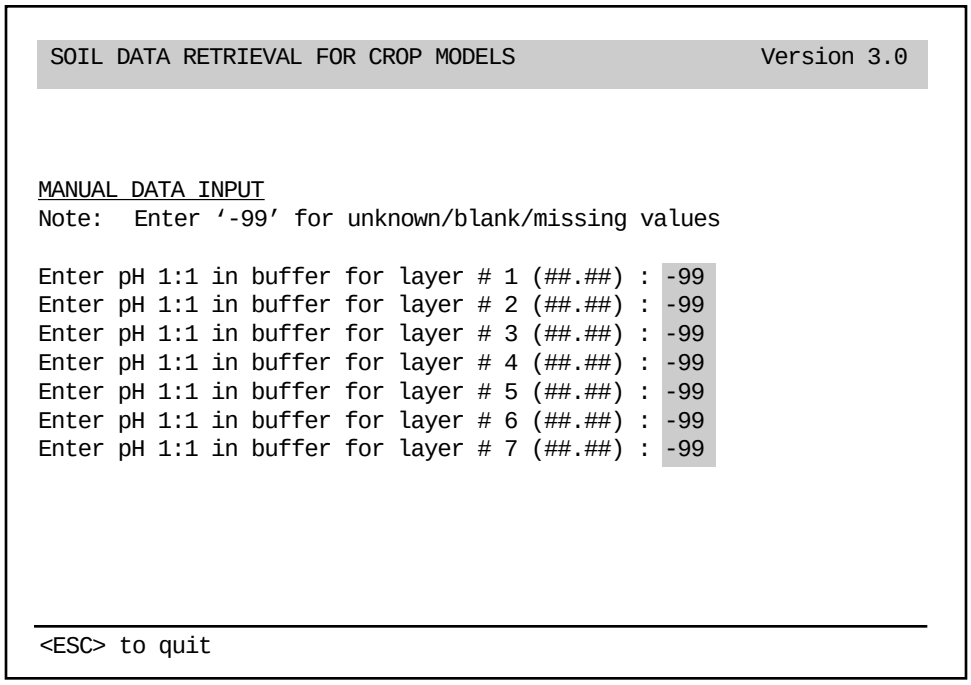
In Screen 37 (above), enter total nitrogen, as g/kg, for each soil layer.

```
 SOIL DATA RETRIEVAL FOR CROP MODELS                    Version 3.0


MANUAL DATA INPUT

Note:  Enter '-99' for unknown/blank/missing values

Enter pH  1:1  in  water  for layer  #  1  (##.##) :  5.6
Enter pH  1:1  in  water  for layer  #  2  (##.##) :  5.1
Enter pH  1:1  in  water  for layer  #  3  (##.##) :  4.7
Enter pH  1:1  in  water  for layer  #  4  (##.##) :  5.4
Enter pH  1:1  in  water  for layer  #  5  (##.##) :  6.7
Enter pH  1:1  in  water  for layer  #  6  (##.##) :   9
Enter pH  1:1  in  water  for layer  #  7  (##.##) :  8.7



   <ESC> to quit
```

SCREEN 38.

pH IN H_2O

In Screen 38 (above), enter the pH of the soil in water for each soil layer.



SCREEN 39.

pH IN BUFFER

In Screen 39 (above), enter the pH of the soil in a buffer for each soil layer.

```
 SOIL DATA RETRIEVAL FOR CROP MODELS                    Version 3.0


MANUAL DATA INPUT

Note:  If pH > 5.5, then Al=0
       Enter '-99' for unknown/blank/missing values

Enter % Al  Saturation  for  layer  #  1  (###)  : 0
Enter % Al  Saturation  for  layer  #  2  (###)  : 0
Enter % Al  Saturation  for  layer  #  3  (###)  : 0
Enter % Al  Saturation  for  layer  #  4  (###)  : 0
Enter % Al  Saturation  for  layer  #  5  (###)  : 0
Enter % Al  Saturation  for  layer  #  6  (###)  : 0
Enter % Al  Saturation  for  layer  #  7  (###)  : 0


<ESC> to quit
```

SCREEN 40.

ALUMINUM SATURATION

In Screen 40 (above), enter the aluminum saturation of each soil layer.

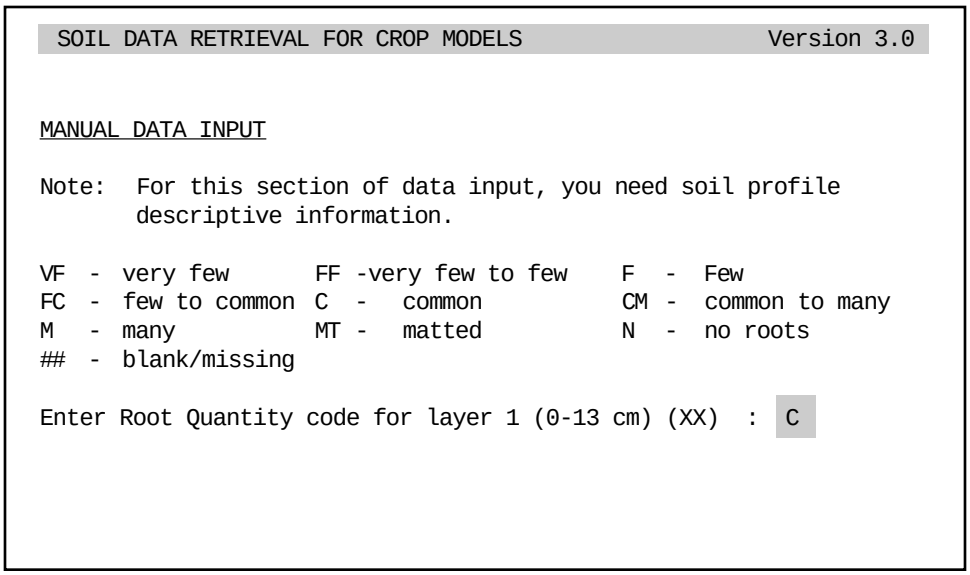
NOTE: If the pH of a particular layer is greater than 5.5, then the program will not prompt for the aluminum saturation value for that layer and will set the percentage of aluminum saturation to 0 (zero).

```
 SOIL DATA RETRIEVAL FOR CROP MODELS                    Version 3.0


MANUAL DATA INPUT
Note:  Enter '-99' for unknown/blank/missing values

Enter CEC cmol/kg for layer # 1 (##.##) : 2.6
Enter CEC cmol/kg for layer # 2 (##.##) : 2.6
Enter CEC cmol/kg for layer # 3 (##.##) : 3.3
Enter CEC cmol/kg for layer # 4 (##.##) : 2.4
Enter CEC cmol/kg for layer # 5 (##.##) : 5.8
Enter CEC cmol/kg for layer # 6 (##.##) : 6.4



<ESC> to quit
```

SCREEN 41.

CEC

In Screen 41 (above), enter CEC, as cmol/kg, for each soil layer.



SCREEN 42.

ROOT QUANTITY INFORMATION

In Screen 42 (above), enter the quantity of roots in each soil layer. For each layer, enter the appropriate code from those listed at the top of the screen (e.g., enter 'C' for "common").

Go to the next section, entitled "Create a Soil Profile," in this Chapter.

CREATE A SOIL PROFILE

This section explains how to create a Soil Profile using data retrieved from the DSSAT soil data files or from data inputted by the user. The Soil Profile created is saved to a model input file called SOIL.SOL.

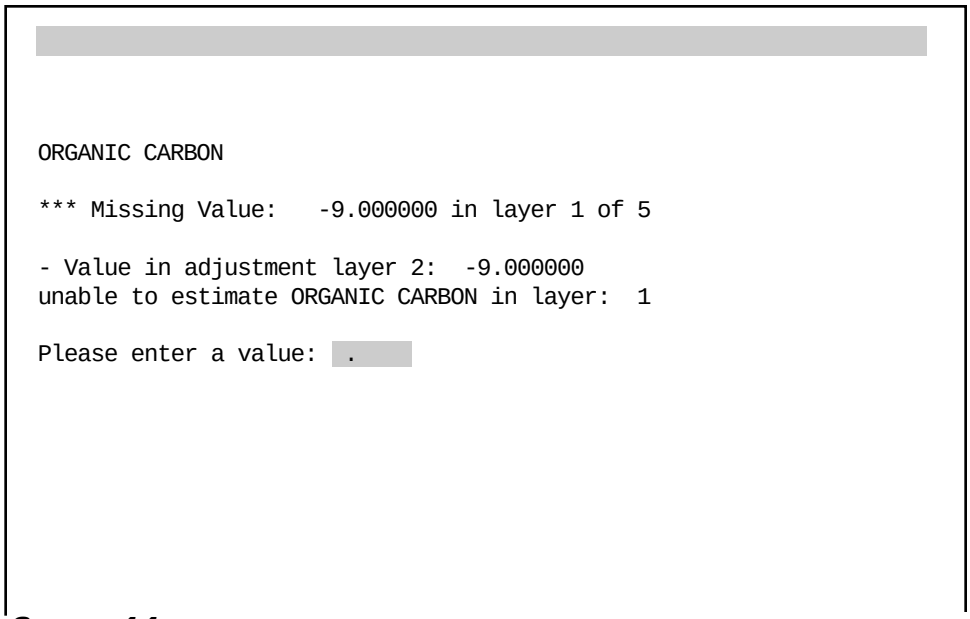
```
  SOIL DATA RETRIEVAL FOR CROP MODELS                  Version 3.0

      *** OTHER INFORMATION ***

 NOTE:  The following information is required for the NITROGEN compo
        nent of the models.  Press <ENTER> to accept DEFAULT values.




Enter Zero-to -unity factor for mineralization (def. = 1) :
```

SCREEN 43.

NITROGEN DATA

If you have retrieved data using Option 2, "Retrieve Data from DSSAT Soil Data Files" (from Screen 17), or if you entered soil data manually using Option 1, "Manually Input Soil Data for SOIL.SOL" Screen 43 (above) will now be displayed and you will be prompted for a nitrogen mineralization value for the soil profile is being created. When the value is entered, you will be prompted with the question "Are these values OK?"

If you do not know the value, a default value of 1.0 can be entered.



SCREEN 44.

MISSING DATA

If soil input data are missing from retrieved or entered files, you will be prompted to provide actual or estimated values by soil layer. For example, if ORGANIC CARBON values were not entered or missing, you will be requested for values for each layer, (Screen 44). If data are missing for bulk density, % course fraction, and aluminum saturation, you will be requested for actual or estimated values.

```
 SOIL DATA RETRIEVAL FOR CROP MODELS                    Version 3.0


*** INPUT DATA ***

Inst.  ID = IB        Country = THAILAND
Site = UNKNOWN
Lat =  -99.000         Long =  -99.000     Sample Yr = 82

Taxon = COARSE-LOAMY, SILICEOUS, ISOHYPERTHERMIC TYPIC NATRUSTALF

Slope = 1 %
Color = BN
Permeability code  = 4
Drainage code      = 5

Dmod = 1.000000

Press any key to continue
```

SCREEN 45.

ERROR-CHECKED DATA

Before variables are calculated from the retrieved or input data, four screens displaying these data are presented. Screen 45 (above) is the first screen of data.

Dmod - Zero-to-unity factor for mineralization

SOIL DATA RETRIEVAL FOR CROP MODELS Version 3.0

*** INPUT DATA ***

Layer	Upper	Lower	Horizon	Clay	Silt	Sand
1	0	13	AP	3.2	18.9	77.9
2	13	30	AP	8.5	14.1	77.4
3	30	62	BA	10.5	16.1	73.4
4	62	84	BA	8.9	17.5	73.6
5	84	100	BT	12.5	17.0	70.5
6	100	140	BT	12.5	18.5	68.9
7	140	180	BT	14.5	16.2	69.3

Press any key to continue

SCREEN 46.

Screen 46 is the second screen of data.

SOIL DATA RETRIEVAL FOR CROP MODELS Version 3.0

*** INPUT DATA ***

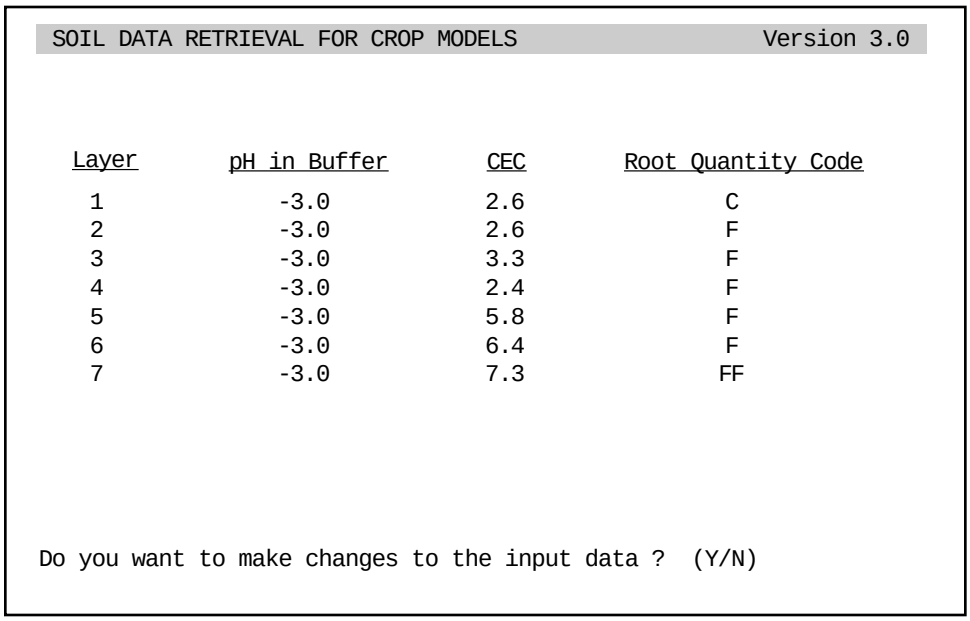
Layer	% Stone	OC	BD 1/3 bar	Al SAT	pH in H20
1	0.0	0.42	1.66	0.0	5.6
2	0.0	0.32	1.68	0.0	5.1
3	0.0	0.17	1.58	0.0	4.7
4	0.0	0.13	1.55	0.0	5.4
5	0.0	0.17	1.76	0.0	6.7
6	0.0	0.15	1.63	0.0	9.0
7	0.0	0.13	1.57	0.0	8.7

Press any key to continue

SCREEN 47.

Screen 47 is the third screen of data.

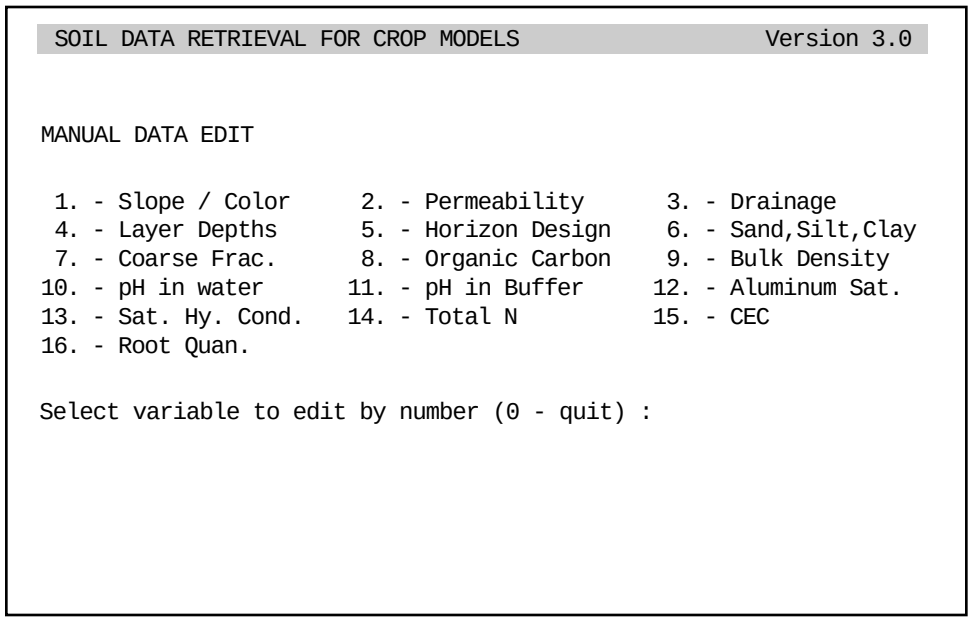
OC - Organic Carbon (%)
BD - Bulk Density (g/cm^3)
AlSAT - Aluminum Saturation (%)



SCREEN 48.

Screen 48 is the fourth screen of data. At this point, you may change any or all of the data.

At the prompt to make changes in Screen 48, if you choose 'Y', Screen 49 (on the following page) will appear. If you choose 'N' at the prompt, go to the section entitled "Calculated Data."



SCREEN 49.

FINAL DATA EDITING

From the Manual Data Edit menu shown in Screen 49 (above), choose the input variable value(s) you wish to change by selecting and entering the corresponding number. The screens presented after entering a number will be those previously presented for that variable.

Enter zero (0) when all values are correct. The program will then begin variable data calculations (see Screen 50).

```
 SOIL DATA RETRIEVAL FOR CROP MODELS                    Version 3.0



*** Beginning CALCULATIONS ***

Calculating Soil Water Content Values...
Layer  #  1 :  LL  =  0.052737  DUL  =  0.169387  SAT  =  0.296600
Layer  #  2 :  LL  =  0.053312  DUL  =  0.171228  SAT  =  0.309597
Layer  #  3 :  LL  =  0.076278  DUL  =  0.183114  SAT  =  0.316859
Layer  #  4 :  LL  =  0.069708  DUL  =  0.177139  SAT  =  0.313949
Layer  #  5 :  LL  =  0.084528  DUL  =  0.191868  SAT  =  0.322452
Layer  #  6 :  LL  =  0.084962  DUL  =  0.193020  SAT  =  0.324211
Layer  #  7 :  LL  =  0.092766  DUL  =  0.199787  SAT  =  0.325858


Press any key to continue
```

SCREEN 50.

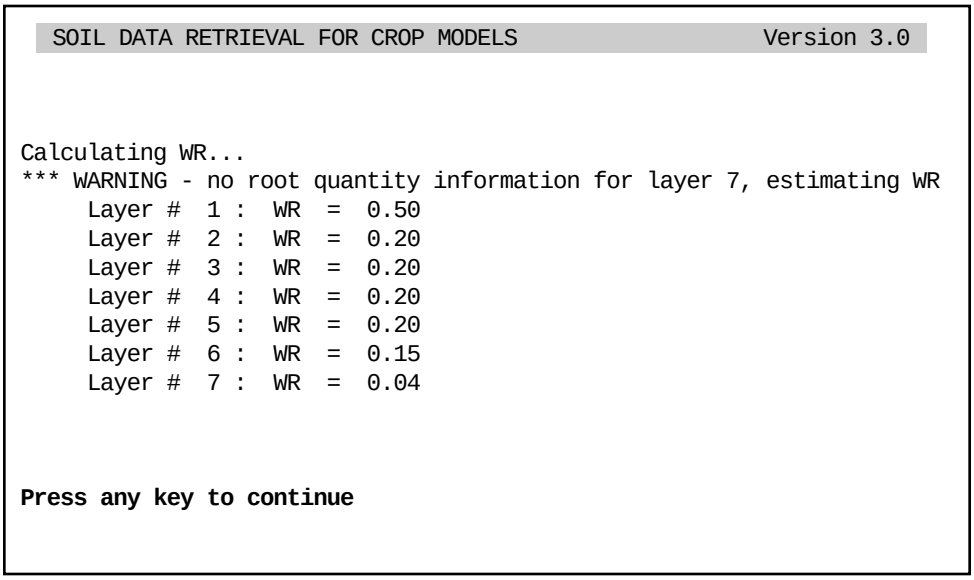
CALCULATED DATA

`Soil Water Contents.` The soil water contents values are printed on the screen (Screen 50 above) as they are calculated.

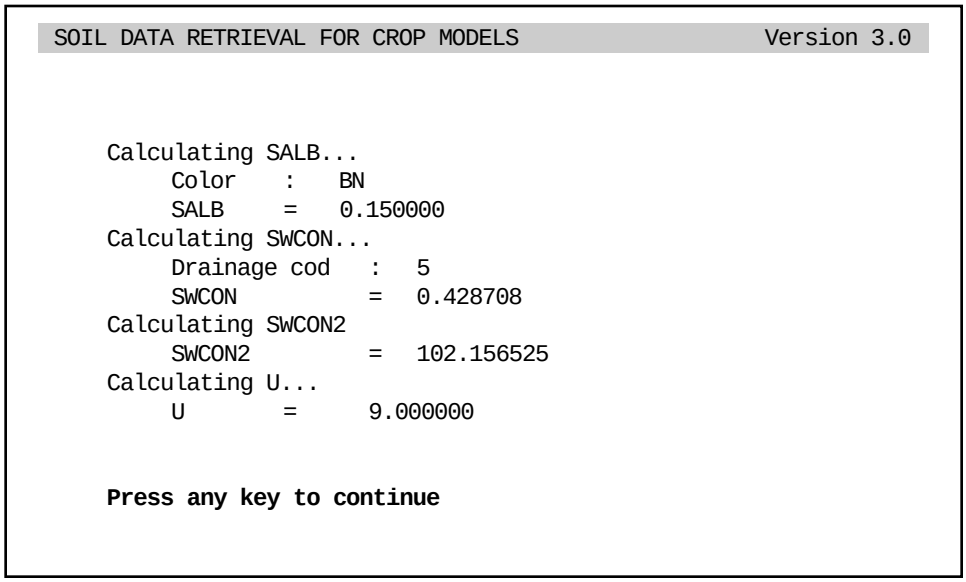
LL - Lower Limit (%, volume basis)
DUL - Drain Upper Limit (%, volume basis)
SAT - Saturation (%, volume basis)

`Root Growth Weighting Factor.` Next, the program calculates WR, the weighting factor used to determine new root growth, using two methods (see Screen 51 on following page). One method uses root abundance information, if any, and a table to determine WR values for each layer. The other method uses a formula based on the depth of each soil layer and is further modified depending on the values given for soil pH and Al saturation for each layer.

If the root abundance information is not in the retrieved data or has not been inputted for a certain layer, the second method to estimate WR for that layer will be used.

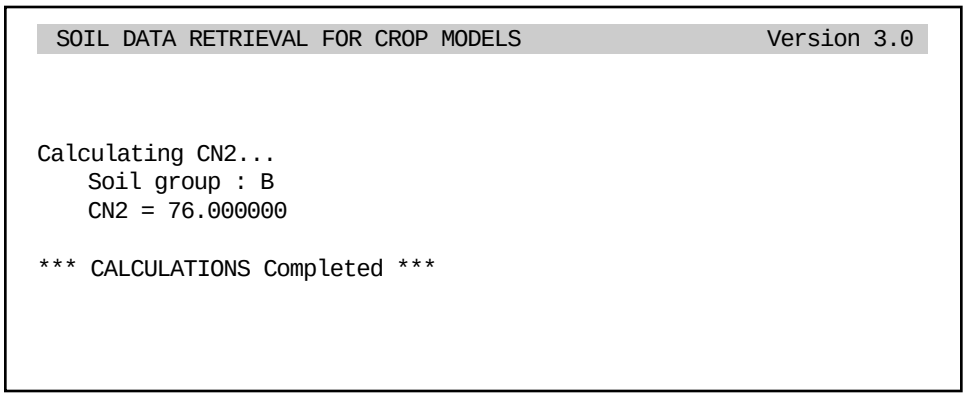


SCREEN 51.



SCREEN 52.

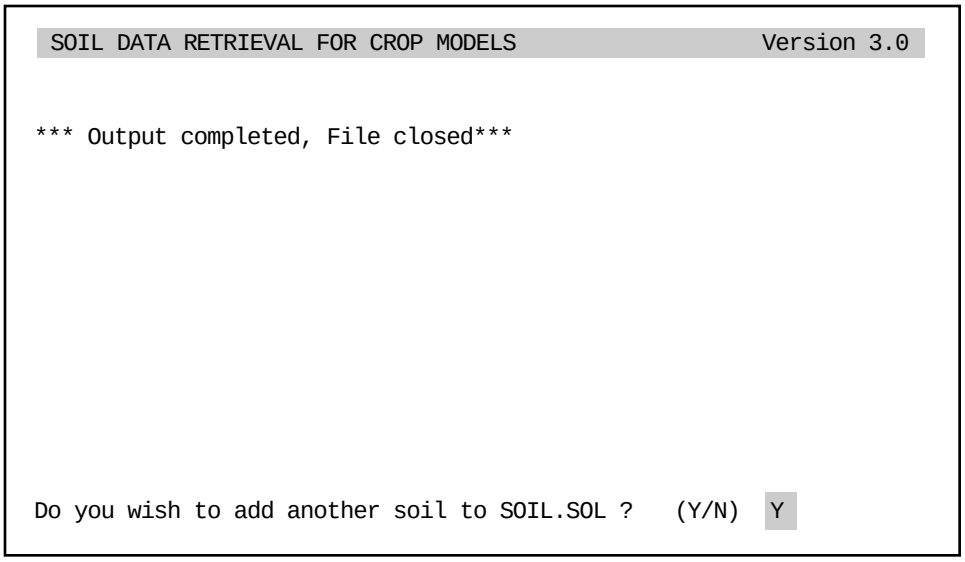
SALB, U, SWCON, SWCON2, CN2. As shown in Screen 52 (above) and Screen 53 (on the following page), the program next calculates values for Bare Soil Albedo (SALB), Upper Limit of stage 1 Soil Evaporation (U), Soil Water Drainage Constant (SWCON), SWCON2 and Runoff Curve Number (CN2).



SCREEN 53.

QUIT

After processing for the current soil profile has been completed, a message will be displayed on the screen (see Screen 54 below) and you will be asked if you wish to create another soil profile.



SCREEN 54.

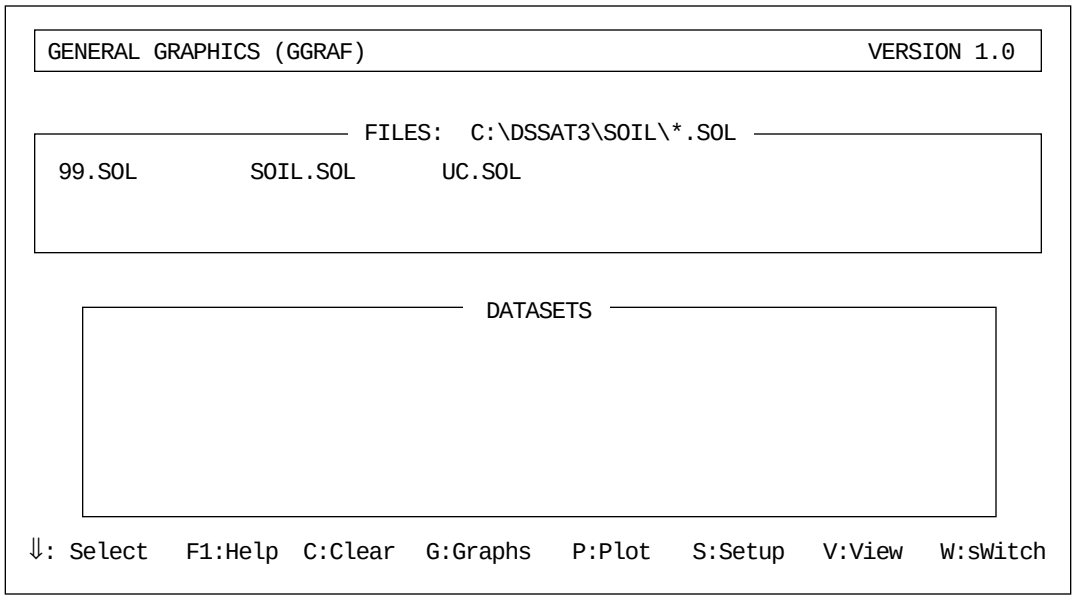
Type 'Y' to begin the program again.

Type 'N' to return to the DSSAT Shell main menu.

UTILITIES

The purpose of the "Utilities" menu option is enable users to graph selected soil properties vs. depth. This program, called GUMGRAF, was written by R. Matthews for crop models. The graph program works with the standardized DSSAT v3 data files which have data in columns with variables defined by abbreviations. For a complete description of these files, their formats and structure, see Volume 2-1, Jones et al. 1994, of this book.

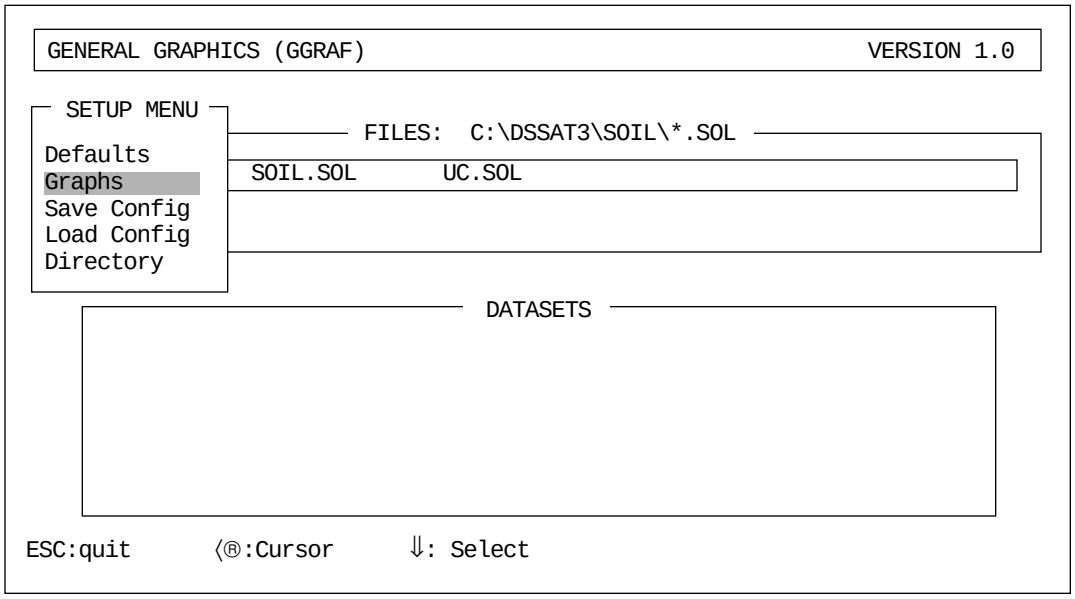
To open this menu option, press the<U> key or highlight "Utilities" and press the <ENTER> key. Screen 55 (below) will be presented, listing soil files which can be graphed.



SCREEN 55.

While viewing Screen 55, you have access to a set of function keys, shown at the bottom of the screen. You may clear the screen, graph, plot, setup the graphs, view the data files and switch between the top and bottom windows by using the <C>, <G>, <P>, <S>, <V> and <W> keys, respectively. To select a file displayed on the screen, highlight it and press the <ENTER> key.

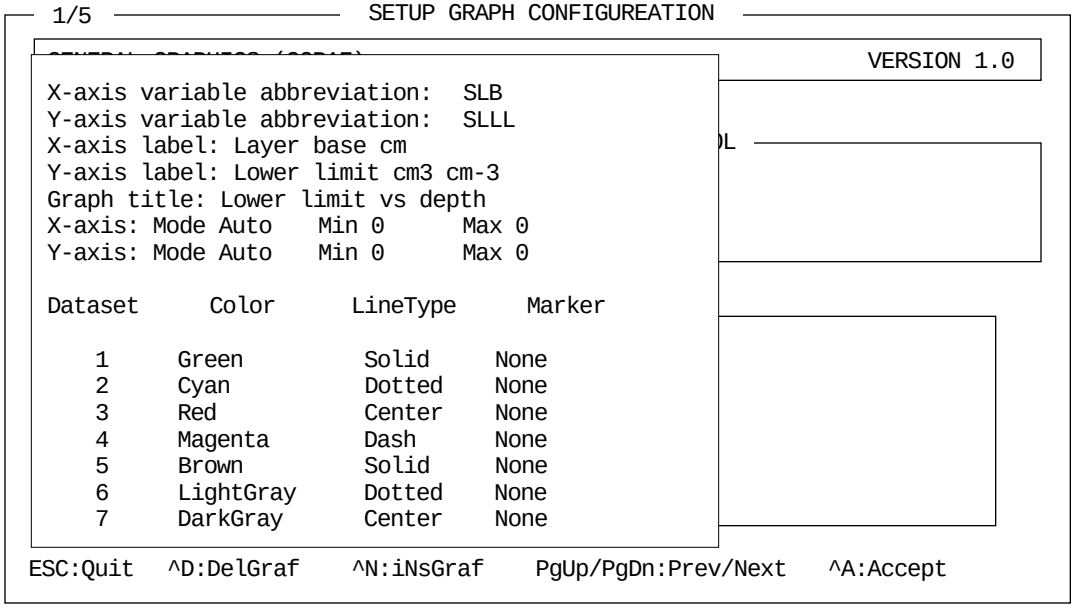
Before graphing, one or more graphs should first be defined from the setup menu. To access this menu, press the <S> key. The SETUP menu shown in Screen 56 (on the following page) will be displayed.



SCREEN 56.

SET UP GRAPH

To set up a graph(s), highlight the "Graphs" option, shown in Screen 56, under the Setup menu, using the arrow keys, and press the <ENTER> key. A dialog box, shown in Screen 57 (below) will be presented.



SCREEN 57.

Define the X and Y variables by entering variable names in Screen 57 as defined in Volume 2-1 (Jones et al. 1994) of this book for the soil file (FILES). The default values found in the dialog box in Screen 57 may be used. Use the <PgUp> and <PgDn> keys to move through the various pages in this dialog box, each presenting different X/Y axes for graphing. You may also enter a Graph Title and Min and Max increments for plotting, as well as the color, linetype and marker for each line plot on each graph.

When you have completed your selection, press <Ctrl><A>, or press <ESC> if you do not wish to use the data you have entered. If you do press <Ctrl><A>, the graph data entered will be used to plot the graph(s), but will be lost when you exit the Utilities program. To save your configurations, highlight, using the arrow keys, the "Save Config" option under the SETUP menu, and press the <ENTER> key. Enter in the dialog box presented, the drive and path and file name where you want the data stored, or use the default given.

You may also load previously saved graph data from the SETUP menu by using the "Load Config" option.

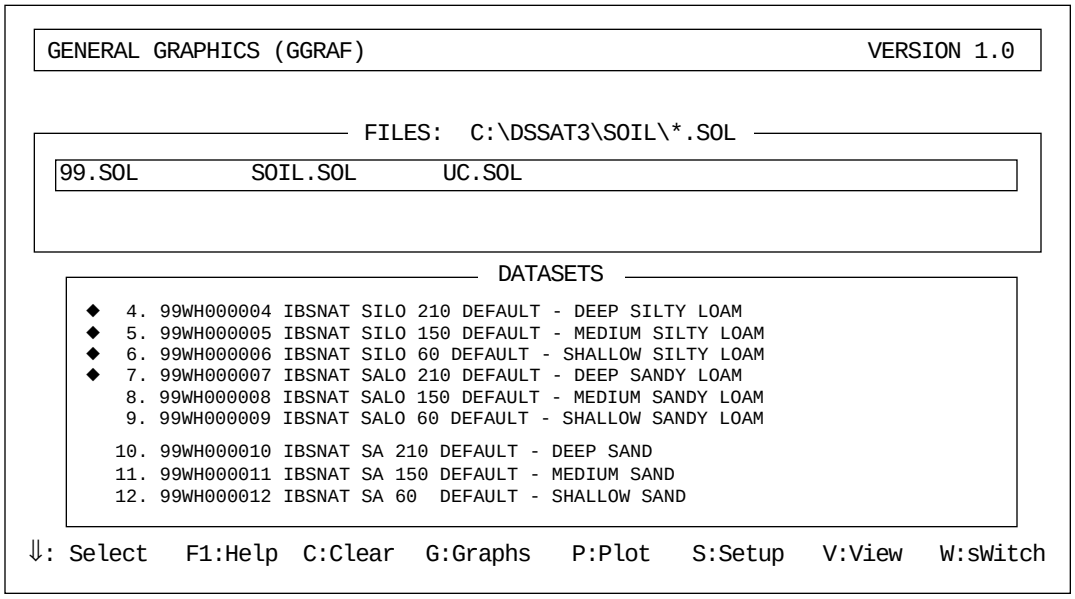
Select Data Sets For Graphing

When you have defined your graph(s), return to Screen 55 by pressing the <ESC> key. Select one or more files from the upper window. To do this, highlight a file and press the <ENTER> key. A listing of data sets in this file will be presented in the bottom window (see Screen 58 on following page).

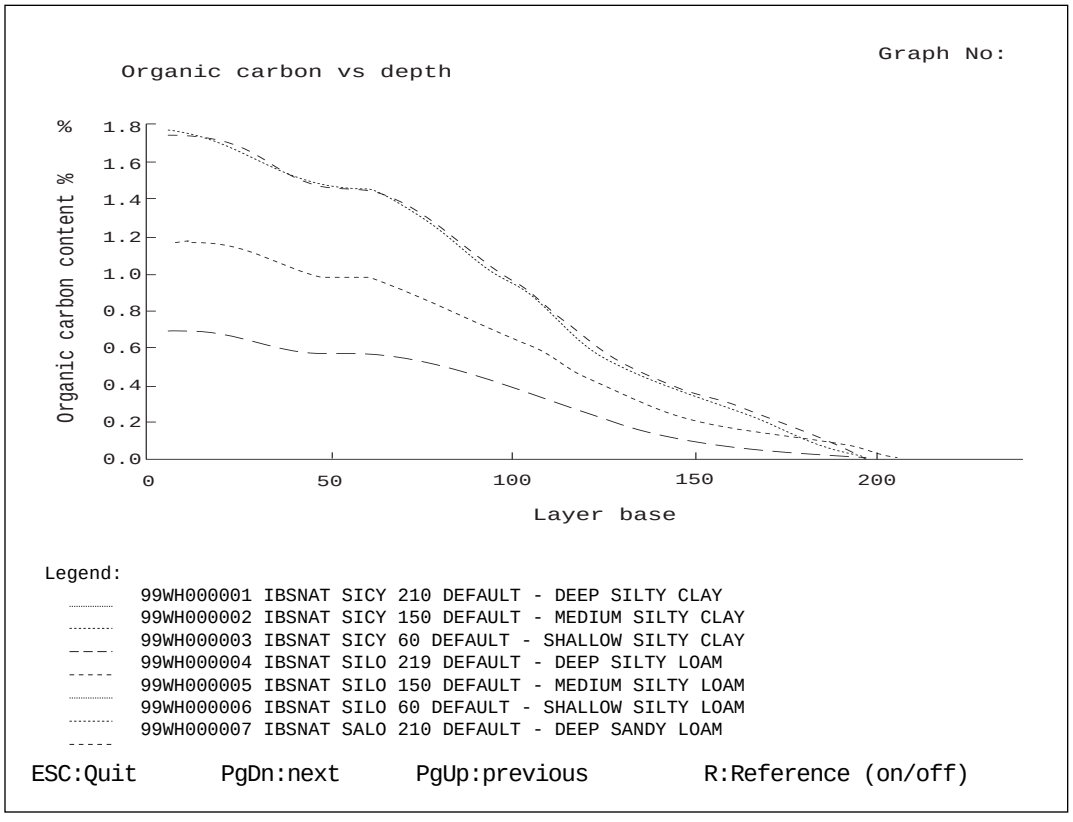
Move the selection bar to the bottom window of Screen 58 by using the <W> key. From the list in the bottom window, select data sets for graphing by highlighting an item and pressing the <ENTER> key. A data set selected has a u mark to its left. Toggle selections On/Off with the <ENTER> key.

Plot Graph(s)

When you have made your data set selections, press the <P> key. The first graph of your variable and data set selections will be presented (see Screen 59 on following page).. Use the <PgUp> and <PgDn> keys to view graphs presenting other X/Y variable selections and data sets.



SCREEN 58.



SCREEN 59.

CHAPTER EIGHT.

DATA MENU OPTION: PEST

To access the "Pest" menu option under the DATA main menu item, highlight DATA and then press the <P> key or move the highlight bar with the arrow keys to "Pest" and press the <ENTER> key. The purpose of the "Pest" menu is to provide users access to information on pests of different crops for listing, editing, printing, and viewing. Data files that contain pest coefficients for integrating pest damage to crop models are available for viewing and modifying using a text editor found under this section. The pest coefficients quantify the amount of damage by different pests to different crop tissues or reductions in rate variables (such as photosynthesis) per unit of pest population or damage that is observed. In DSSAT v3, pest files are available for only three crops: soybean, drybean and peanut. Pests have also been coupled to rice using this same approach (Pinnschmidt et al., 1991), but this model is not yet available in DSSAT v3. When "Pest" is accessed, Screen 60 (below) is presented, displaying the global list of pest files with file name and description.

```
General File Manager - PEST INFORMATION                          Version 3.0
                      - Files In Directory: C:\DSSAT3\PEST -
 L    FILE NAME         FILE HEADING
 √    BNGRO930.PST      PEST PARAMETER INPUT FILE (DRY BEAN)
 √    PNGRO930.PST      PEST PARAMETER INPUT FILE (PEANUT)
 √    SBGRO930.PST      PEST PARAMETER INPUT FILE (SOYBEAN)
F1  - Help                    F4  - Search              F7  - Colour OFF
F2  - Institute Listing       F5  - Sort                F8  - Edit
F3  - Site Listing            F6  - Print               F9  - Remake List
Esc - Quit            L - Include/Exclude In Sublist    F10 - Edit Config File
```

SCREEN 60.

The pest FILENAME is the name of the pest file. The FILE HEADING describes the file. The general functions for searching, sending, printing and editing are similar to the other data operations already described in Chapter 4 herein, as are the <F9> and <L> keys.

All of the PST files contained in the directory specified in the file DSSATPRO.FLE for pests will be listed in Screen 60. The <F10> button in this screen allows you to specify an alternate name for the Pest list, and you can configure wild card inclusions and exclusions from the list. If additional PST files are added to that directory, the <F9> key will add them to the list and remake the list.

To edit any of the pest files listed, highlight a file using the arrow keys and press the <F8> key. The file containing the highlighted pest information is accessed either by the editor supplied with DSSAT v3 or one that you have installed. Depending on the editor used, the information will be presented in a screen similar to Screen 61 (below). The format of any data you enter must adhere to the specifications given in Volume 2-1 (Hoogenboom et al. 1994) of this book.

```
*PEST PARAMETER INPUT FILE (PEANUT)

01 CEW6 Corn Earworm          1 LAD   0.00505000     0.0000  m2/larva/d   Szm
02 VBC5 5 Instar Velvetbean  1 LAD   0.00081000     0.0000  m2/larva/d   Rie
03 VBC6 6 Instar Velvetbean  1 LAD   0.00144000     0.0000  m2/larva/d   Rei
04 SL4  Soybean Looper       1 LAD   0.00044000     0.0000  m2/larva/d   Rei
05 SL5  Soybean Looper       1 LAD   0.00071000     0.0000  m2/larva/d   Rei
06 SL6  Soybean Looper       1 LAD   0.00124000     0.0000  m2/larva/d   Rei
07 FAW  Fall Armyworm        1 LMD   2.00000000     0.0000  g/larva/d    est
08 RTWM rootworm             1 RLV   1.00000000     0.0000  cm/cm2/lar/d est
09 PCLA Obs.% defoliation    2 LAD   1.00000000     0.0000  %
10 PSTM Obs.% Stem damage    2 SMD   1.00000000     0.0000  %
11 PDLA % Diseased Leaf Area 3 PDLA  1.00000000     0.0000  %/day
12 PRP  % Reduction in Photo 3 ASM   1.00000000     0.0000  %/day
13 PLAI % daily LAI dest.    3 LAD   1.00000000     0.0000  %/day
14 PLM  % daily Leaf Mass    3 LMD   1.00000000     0.0000  %/day
15 PWP  % Whole Plants       3 WPD   1.00000000     0.0000  %/day
16 PSDN % All Seed Dest.     3 SDNL  1.00000000     0.0000  %/day
                               SDNS  1.00000000     0.0000  %/day
                               SDNM  1.00000000     0.0000  %/day
17 PSHN % All Shell Dest.    3 SHNL  1.00000000     0.0000  %/day
                               SHNS  1.00000000     0.0000  %/day
                               SHNM  1.00000000     0.0000  %/day
18 PPDN % All Pod Dest.      3 PPDN  1.00000000     0.0000  %/day
```

SCREEN 61.

CHAPTER NINE.
DATA MENU OPTION: ECONOMICS

To access the "Economics" menu option under the DATA main menu item, highlight DATA and then press the <E> key or move the highlight bar with the arrow keys to "Economics" and press the <ENTER> key. The purpose of the "Economics" menu is to provide users access to economic data on crops and inputs for production for viewing, printing, listing and editing. These data can be stored by year to document the time changes in economic factors by region. Data are stored in files named by institute and site. These files will be used for the price data for strategy analyses. When "Economics" is accessed, Screen 62 (below) will be presented, displaying the global list of economic files with file name and description.

```
General File Manager - ECONOMIC INFORMATION                    Version 3.0

                    - Files In Directory: C:\DSSAT3\ECONOMIC -

 L   FILE NAME        FILE HEADING
 √   DEFAULT.PRI      PRICE-COST_FILE : DEFAULT FOR SEASONAL ANALYSIS
 √   DEFAULT.PRQ      PRICE-COST_FILE : DEFAULT FOR SEQUENCE ANALYSIS

F1  - Help                    F4  - Search             F7  - Colour OFF
F2  - Institute Listing       F5  - Sort               F8  - Edit
F3  - Site Listing            F6  - Print              F9  - Remake List
Esc - Quit           L - Include/Exclude In Sublist    F10 - Edit Config File
```

SCREEN 62.

The economic FILENAME is the name of the economics file. The FILE HEADING describes the file. The general functions for searching, sending, printing and editing are similar to the other data operations already described in Chapter 4 herein, as are the <F9> and <L> keys.

All of the PRI files contained in the directory specified in the file DSSATPRO.FLE for prices will be listed. The <F10> button in Screen 62 allows you to specify an alternate name for the Price list, and you can configure wild card inclusions and exclusions from this list. If additional PRI files are added to that directory, the <F9> key will remake and add them to the list.

To edit any of the economic files listed, highlight a file using the arrow keys and press the <F8> key. The file containing the highlighted economic information is accessed either by the editor supplied with DSSAT v3 or one that you have installed. Depending on the editor used, the information will be presented in a screen similar to Screen 63 (below). The format of any data you enter must adhere to the specifications given in Volume 3-1 (Thornton et al. 1994) of this book.

```
*PRICE-COST_FILE : DEFAULT FOR SEASONAL ANALYSIS

! if IDIS=-1, cost/price component is ignored in analysis
! if IDIS= 0, fixed value in Par1
! if IDIS= 1, uniform variate (PAR1=lower, PAR2=upper bound)
! if IDIS= 2, triangular variate (PAR1=lower, PAR2=mode, PAR3=upper bound)
! if IDIS= 3, normal variate (PAR1=mean, PAR2=st. dev.)

! File sectioned by crop.  A crop's treatment sections must be contiguous.

* MZ
* TREATMENT 1
@PRAM     GRAN      BYPR       BASE     NFER      NCOS      IRRI     IRCO
IDIS         3         0          0        0         0         0        0
PAR1    160.00     10.00    240.00     0.45     12.00       .50    12.50
PAR2     16.00       .00       .00      .00       .00       .00      .00
PAR3       .00       .00       .00      .00       .00       .00      .00

* SB
* TREATMENT 1
@PRAM     GRAN     BYPR        BASE      NFER    NCOS       IRRI     IRCO
IDIS         3        0          0         0       0          0        0
PAR1    320.00     0.00     390.00       0.45   12.00        .50    12.50
PAR2     32.00      .00        .00        .00     .00        .00      .00
```

SCREEN 63.

CHAPTER TEN.
MODELS MENU OPTIONS

Under the MODELS main menu item are listed “C Cereal”, “L Legumes,” “R Root Crops” and “O Other.” These items provide users with access to crop simulation models for simulating the performance of real experiments and for comparing model results with observed results. Capabilities for interactive sensitivity analyses on model parameters and for simulating hypothetical management practices are also accessed under the MODELS main menu item. Graphs of simulated and observed data can be viewed and printed, numerical results of simulations can be viewed, and new FILEXs or hypothetical experiments can be input. A detailed description and use of the crop models can be found in Volume 2-2 (Hoogenboom et al. 1994) of this book, and details of seasonal and sequential strategy analysis and their operation can be found in Volumes 3-1 (Thornton et al. 1994 a and 3-2 (Thornton et al. 1994 b) of this book, respectively, as well as in Chapter 11 herein.

CEREALS

To access the "Cereals” menu option under the MODELS main menu item, highlight MODELS and then press the <C> key or move the highlight bar with the arrow keys to "Cereals” and press the <ENTER> key. A list of cereal or CERES crop models (shown below) converted to conform to DSSAT v3 file and format structures will be presented. All of these crops except rice have been implemented in a single executable code to minimize duplication of programming for input and output file features. The rice model is in a separate executable module. The following cereal crops can be simulated:

B Barley
M Maize
P Millet
R Rice
S Sorghum
W Wheat

LEGUMES

To access the "Legumes” menu option under the MODELS main menu item, highlight MODELS and then press the <L> key or move the highlight bar with the arrow keys to "Legumes” and press the <ENTER> key. A list of legume or CROPGRO crop models (shown below) converted to conform to DSSAT v3 file

and format structures will be presented. Like the CERES models, the CROPGRO models have been implemented with a modular code code to minimize duplication of programming for input and output file features. The following legume crops can be simulated:

S Soybean
P Peanut
D Drybean

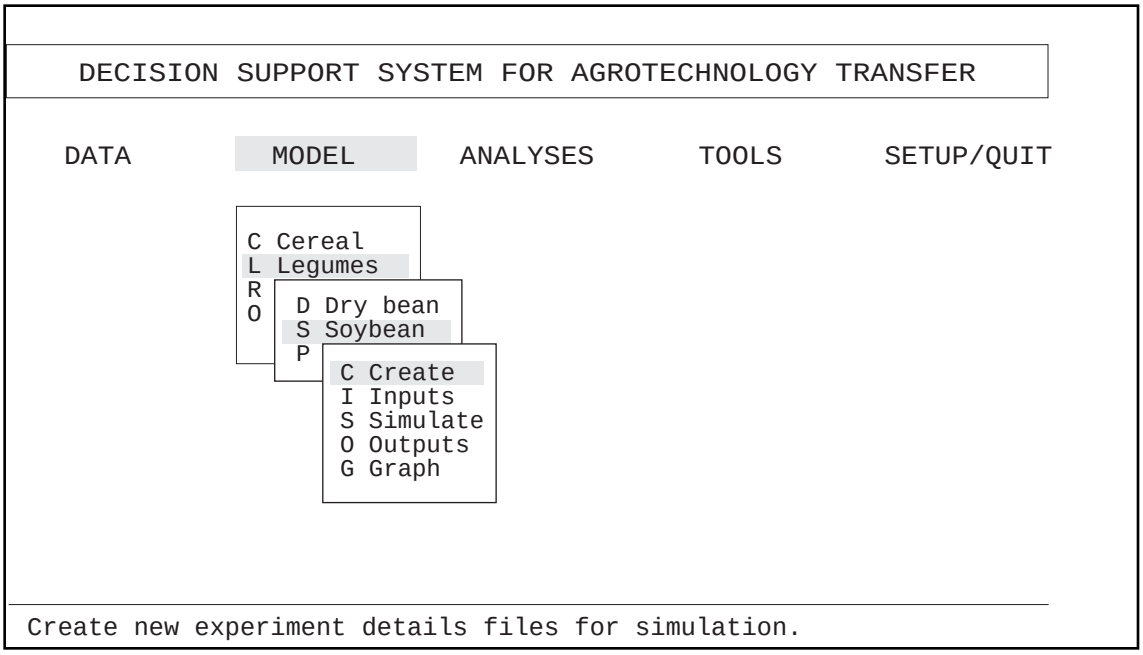
Root Crops

To access the "Root Crops" menu option under the MODELS main menu item, highlight MODELS and then press the <R> key or move the highlight bar with the arrow keys to "Root Crops" and press the <ENTER> key. A list of root crop models (shown below) will be presented. These models have not been converted to conform to DSSAT v3 file and format structures. Of the following Root Crops, only cassava can be simulated:

A Aroid
C Cassava
P Potato

Others

To access the "Others" menu option under the MODELS main menu item, highlight MODELS and then press the <O> key or move the highlight bar with the arrow keys to "Others" and press the <ENTER> key. This option allows other models to be incorporated into DSSAT in order to use the data contained within the system and to take advantage of the various graphics and strategy analysis capabilities, provided those models adhere to the DSSAT v3 files and data formats.



SCREEN 64.

When any of the crop models listed under the MODELS main menu item is opened, the menu options shown in Screen 64 (above) will be presented. For example, as shown in Screen 64, after “Legumes” and then “Soybean” are highlighted, the third tier of menu options is available for access. These options are described below.

CREATE

The purpose of the "Create" menu option is to allow users to create a new set of inputs for a real or hypothetical experiment. Opening this option calls the program, XCreate, which enables a user to load an existing experiment and modify the crop management and other inputs to those described in Volume 2-1 (Jones et al. 1994) of this book. XCreate is also used to input experimental practices for an actual experiment and is the same program used to enter multiple season or sequence input conditions under the ANALYSES main menu option described in Chapter 11 herein.

To open the “Create” menu option, press the <C> key or highlight “Create” and press the <ENTER> key. For a detailed description of the operation of XCreate, see Part 4 of this Volume (Volume 1-4, Imamura et al. 1994).

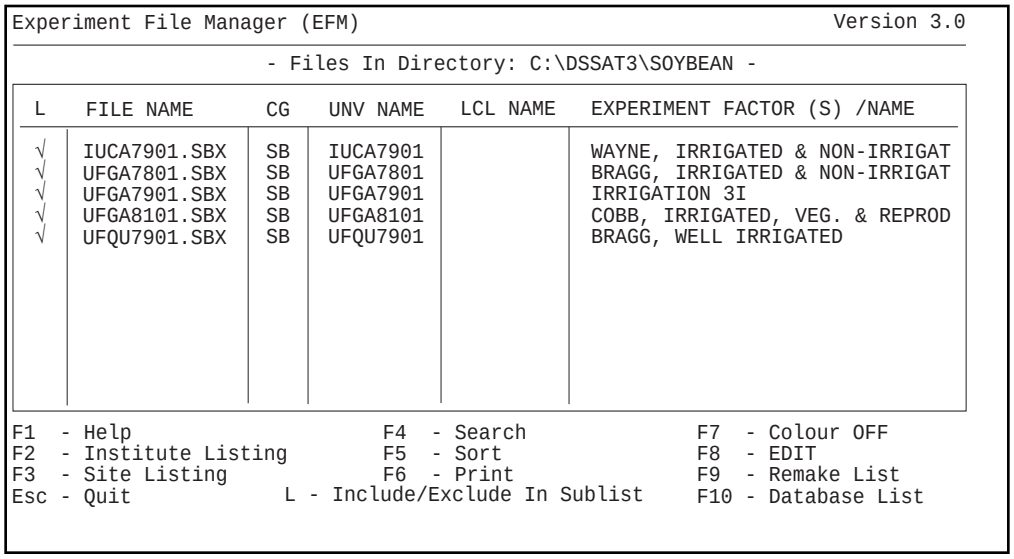
INPUTS

The purposes of the "Inputs" menu option are as follows:

1. Lists all experiments in a path, giving its file name, the crop code, standard and local experiment names, and a brief description of the experiment. Keeps this list of files in a file named EXPLST.DBF, which is updated after new experiments are added using the <F9> key.
2. Provides access to any of the experiment files (FILEXs) using a file editor. Users can choose experimental data files (FILEXs), crop performance averages (in FILETs and FILEAs). Access is either with a user-installed text editor or an internal editor distributed with DSSAT v3.
3. Allows for sorting of the files to locate experiments for specified crops, standard or universal names, or local names. Sorting is performed by placing the cursor in a column to search on and pressing the <F5> key to initiate the search operation.
4. Updates the experiment list (EXP.LST) read by the crop models to include new experiments or to reduce the number of experiments that are listed for model simulation. Allows users to toggle any experiment in the path to be included or excluded form EXP.LST, using the <L> key.
5. Allows users to search to locate experiments in the current path based on the types of treatments included in the experiment, on types of soils, on people who conducted the experiments, and on experiments performed at specific institutes. Use the <F4> key.
6. Establish a global list (EXPLSTG.DBF) of experiments for all crops on the computer in various paths, using the F10 key. Allows users to select experiments in other paths and go to that path for maintaining EXP.LST for each crop.

To open the "Inputs" menu option, press the <I> key or highlight "Inputs" and press the <ENTER> key. Screen 65 (see next page) will be presented, displaying experiment file names for the particular crop under which you have opened the "Inputs" option.

Screen 65 is similar to the one found under the "List/Edit" option in Chapter 4. It gives users access to list, view, edit, print and search inputs to the crop models. The only difference is that when accessed under a particular crop model menu, it lists FILEX experiment details (real and hypothetical) that are stored in the directory allocated to that particular crop. The experiments that are checked (left hand column) are listed in the EXP.LST file for access by the crop model, and you may check more or uncheck some to manage the size of your EXP.LST when you have



SCREEN 65.

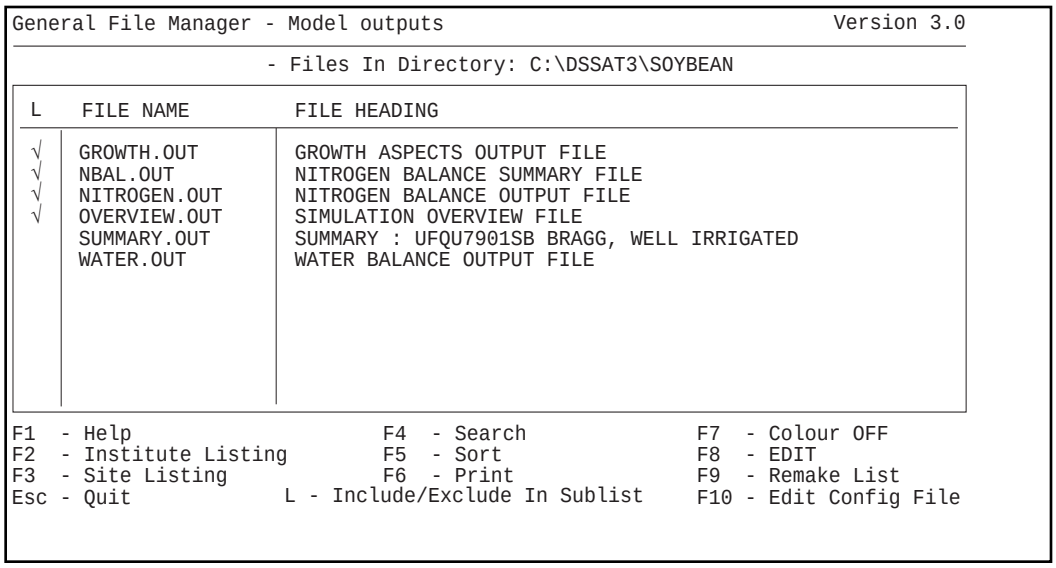
many experiments. You can also toggle (using the <F10>key) to the global database list from here.

For a complete description of the operation of Screen 65, column definitions and key functions, see under "List/Edit" in Chapter 4 herein.

SIMULATE

The purpose of the "Simulate" menu option is to enable users to run a simulation model for a specific crop. When this option is selected, the directory path is changed to the path for the specific crop (e.g., C:\DSSAT3\MAIZE), the appropriate crop model is called, and a list of available experiments for the selected crop is presented. After an experiment from this list is selected by entering the number of the experiment, a screen is presented from which the user selects a treatment from a list of treatments. Following a treatment selection, a screen is presented which allows the user to choose between continuing with the simulation defined by the experiment file selected, or modifying a range of management variables, soil characteristics, weather data and cultivar coefficients for a sensitivity analysis. Then the model is run, displaying summary experiment, soil, weather and simulated results on the screen. Additional runs may be made if desired, before returning to the DSSATv3 Shell.

To open the "Simulate" menu option, press the <S> key or highlight "Simulate" and press the <ENTER> key. For a full description of the operation of DSSAT v3 crop models, see Volume 2-2 (Hoogenboom et al. 1994) of this book.



SCREEN 66.

OUTPUTS

The purpose of the “Outputs" menu option is to give users easy access to crop model output files so that they can be listed, printed and viewed from within the DSSAT v3 Shell. This option allows users to access model output files for the selected crop with the standard naming conventions detailed in Volume 2-1 (Jones et al. 1994) of this book.

To open the "Outputs” menu option, press the <O> key or highlight “Outputs” and press the <ENTER> key. Screen 66 (above) will be presented, displaying the outputs files (OUT) for a particular crop. In example Screen 66, output files for Soybean are listed. For a complete description of the operation of this screen and its key functions, see under “List/Edit” in Chapter 4 herein.

GRAPH

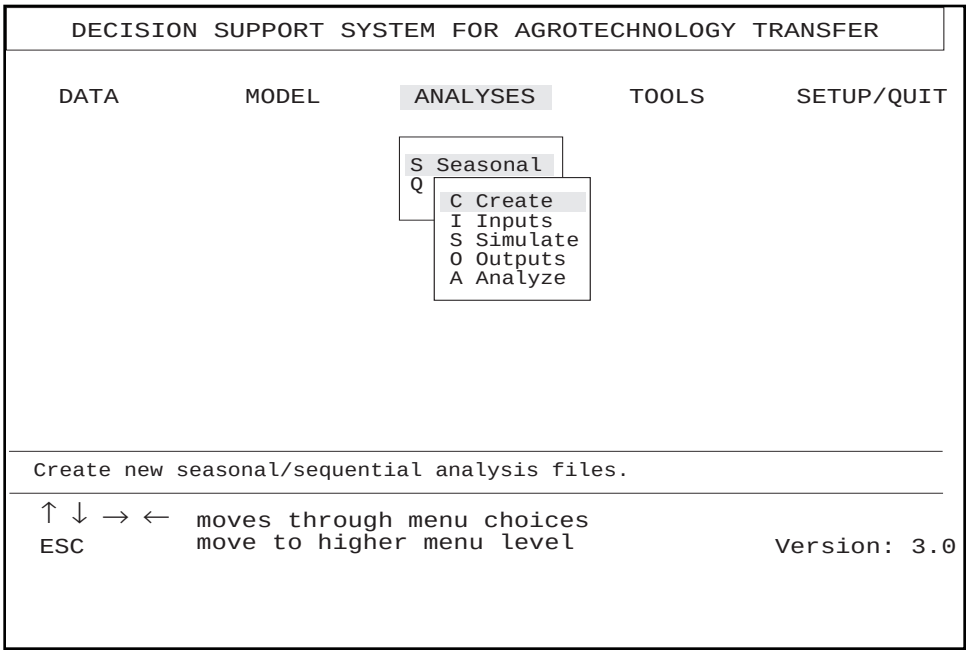
The purpose of the “Graph” menu option is to provide users with graphical analysis of simulated and observed results. A program called Graphing and Simulated and Experiment Data is initiated from DSSAT v3 when this option is selected, and the data used for plotting is for the crop which was selected before “Graph” was opened. Users will have typically simulated one or more experiments and treatments before opening this menu option.

To open the “Graph" menu option, press the <G> key or highlight “Graph” and press the <ENTER> key. For a complete description of Graphing Simulated and Experiment Data program and its operation, see Volume 2-3 (Chan et al. 1994) of this book.

CHAPTER ELEVEN.
ANALYSES MENU OPTIONS

Under the ANALYSES main menu item are options that give users access to two programs, Seasonal Analysis and Sequence Analysis, that provide analysis capabilities for uncertainty and risk as well as for long-term sustainability of agricultural practices at a field scale. Seasonal Analysis allows you to run large experiments with many treatments replicated across many years of simulated or historical weather data. The results can be analyzed by comparing the treatments or "strategies" with respect to a wide variety of model outputs, such as yield. Economic comparison of the treatments can also be made, allowing the user to draw tentative conclusions concerning the economic risk associated with each treatment. In Sequence Analysis mode, crop rotations or sequences can be simulated, along with the attendant carry-over effects of soil water and nitrogen processes from one crop to another, including some fallow periods. These rotations can also be replicated with respect to different weather sequences.

To access the "Seasonal" menu option under the ANALYSES main menu item, highlight ANALYSES and then press the <S> key or move the highlight bar with the arrow keys to "Seasonal" and then press the <ENTER> key. A menu of options available (shown in Screen 67 below) will be presented.



SCREEN 67.

SEASONAL

The purpose of the "Seasonal" menu option is to enable users to run multiple year simulations with one or more crop models, using actual or generated weather data. With this program, soil initial conditions are re-initialized before each season's crop simulation run to simulate the uncertainty in crop performance due to uncertainty in weather under specified starting soil conditions. As many as 20 different combinations of crops and management practices may be specified. The program allows users to create the combination of crops and practices to be run, and to analyze the biophysical variability and economic risks of each practice, indicating the one or ones that are most risk efficient. For a complete description of the operation of the Seasonal program, see Volume 3-1 (Thornton et al. 1994 a) of this book.

CREATE AND OUTPUTS

The purpose and operation of the menu options "Create" and "Outputs" is similar to those described under the same headings in Chapter 10 herein. The screen presented under "Outputs" will be similar to that found in Screen 68, except that the files listed will be Seasonal files with an SNS suffix. For a description of these options and how to use them, see Chapter 10, "Models Menu Options."

INPUTS

The purpose of the "Inputs" menu option is to provide users access to data management functions for maintaining a list of previously defined multi-year experiments for seasonal analysis. This facility allows users to display a list of all available seasonal files, locate those for specific purposes and updata a list that is accessed by the "driver" program for running the crop models. When "Inputs" is selected, a screen similar to Screen 65 presented in Chapter 10 under the same option heading will appear, displaying the global list of seasonal files, crop code, experiment name and a summargy of experimental factors. The only difference is that the files listed in the screen will be Seasonal (SNX) files.

SIMULATE

The purpose of the "Simulate" menu option is to enable users to simulate a set of crop management treatments that were previously created and saved in an experiment list (EXP.LST). A "driver" program displays all available experiments that have been created previously, and users select the one that is to be run. The "driver," called SEADRV.EXE, calls the appropriate crop models to simulate all combinations of crops and treatment combinations, for the number of years specified. Results are saved in a summary output file, called SUMMARY.OUT, or optional-

ly, ssssssss.SNS, where the "ssssssss" stands for the name of the input FILEX used, the "SN" for seasonal analysis, and the final "S" for summary output file. An entry is made to the SEASON.LST file to indicate that another run has been made for variability analysis.

To open the "Simulate" menu option,press the <S> key or highlight "Simulate" and press the <ENTER> key. For a more detailed description of the "Simulate" option and its operation, see Volume 3-1 (Thornton et al. 1994 a) of this book.

Analyze

The purpose of the "Analyze" menu option is to enable users to perform analyses on the variability of simulated crop performance results and on economic variables to provide an assessment of risk of different practices. It accesses previously simulated results. If several seasonal simulations have been run, you will be presented with a list of these to choose from. This program provides graphical outputs of cumulative probabilities and box plots, and it gives the most risk efficient practice(s) from the set that were simulated.

To open the "Analyze" menu option, press the <A> key or highlight "Analyze" and press the <ENTER> key. For a more detailed description of the "Analyze" option and its operation, see Volume 3-1 (Thornton et al. 1994 a) of this book.

Sequence

To access the "Sequence" menu option under the ANALYSES main menu item, highlight ANALYSES and the press the <Q> key or move the highlight bar with the arrow keys to "Sequence" and then press the <ENTER> key. A menu of options available (shown in Screen 67 under "Seasonal") will be presented.

The purpose of the "Sequence" menu option is to give users the capability of running multiple year simulations with one or more crop models, using actual or generated weather data. Here, soil initial conditions are carried over from one crop to the next to simulate the time-changes in soil conditions as practices are simulated. This program allows users to create the combination of crops and practices to be run in rotation, including fallow periods, and to analyze the biophysical variability in results and the economic risks of each practice.

Create

The purpose of the "Create" menu option is to enable users to create a new set of crop management inputs for a multi-year simulation experiment. From this

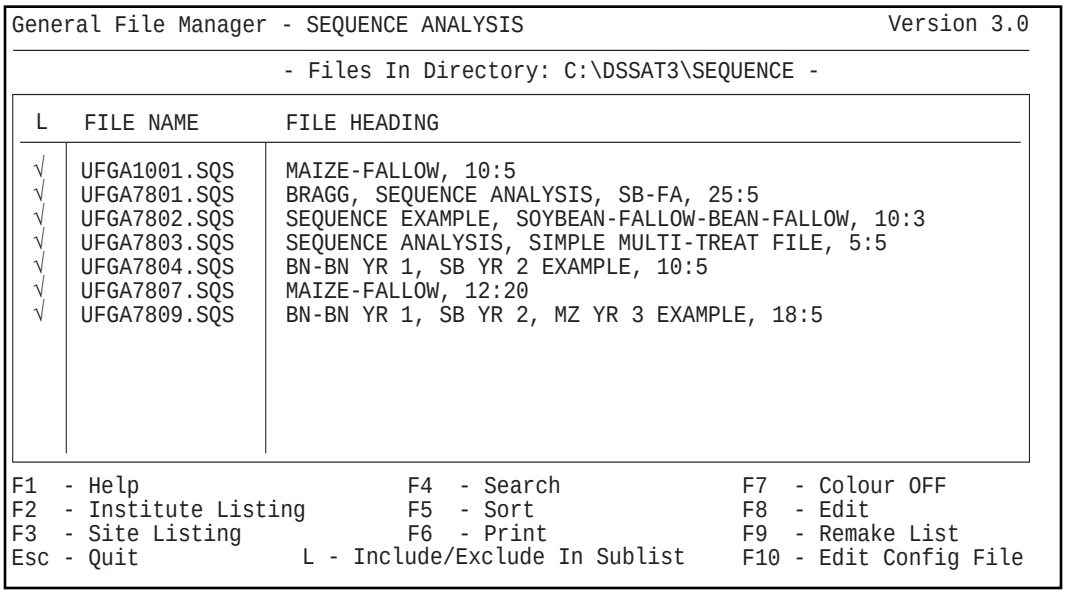
menu item, the XCreate program is called to allow users to load an existing experiment and modify the crop management and other inputs described in the Volume 2-1 (Jones et al. 1994) of this book. XCreate is the same program that is used to create FILEXs (input experimental practices) for an actual experiment, and it and its operation are described in Part 4 of this Volume (Volume 1-4, Imamura et al. 1994).

INPUTS

The purpose of the "Inputs" menu option is to provide users access to data management functions for maintaining a list of previously defined multi-year experiments for sequence analysis. This facility allows users to display a list of all available sequence files, locate those for specific purposes and update a list that is accessed by the "driver" program for running the crop models. When "Inputs" is selected, a screen similar to that presented in Chapter 10, under the same option heading, will appear. The only difference is that the files listed in the screen will be Sequence (SQS) files.

OUTPUTS

The purpose of the "Outputs" menu option is to give users easy access to crop model output files so that they can be listed, printed and viewed from within the DSSAT v3 Shell. The files accessed are model output files for the selected crop with the standard naming conventions detailed in Volume 2-1 (Jones et al. 1994) of this book. The screen presented when "Outputs" is selected is similar to that of Screen 68 (on the followng page). The general <F> key functions for searching, sending, printing and editing are similar to the data operations already described under "List/Edit" in Chapter 4 herein, as are the <F9>, <F10> and <L> keys.



Screen 68.

Users may edit the files listed by pressing the <F8> key. A screen displaying the contents of the file will be presented, with key functions for editing found at the bottom of the screen.

Analyze

The purpose of the "Analyse" menu option is to allow users to simulate a set of crop management treatments that were previously created and saved in an experiment list (EXP.LST). A "driver" program displays all available experiments that have been created previously, users select the one that is to be run. Then, the "driver", called SEQDRV.EXE, calls the appropriate crop models to simulate all combinations of crops and treatment combinations, for the number of years specified. Results are saved in a summary output file, called SUMMARY.OUT or optionally ssssssss.SQS where the "ssssssss" stands for the name of the input FILEX used, the "SQ" for seasonal analysis, and the final "S" for summary output file. An entry is made to the SEQUQNCE.LST file to indicate that another run has been made for crop sequence analysis.

To open the "Analyze" menu option, press the <A> key or highlight "Analyze" and press the <ENTER> key. For a detailed description of the "Analyze" option and its operation, see Volume 3-2 (Thornton et al. 1994 b) of this book.

CHAPTER TWELVE.
TOOLS MENU OPTIONS

Under the TOOLS main menu item are options that give users access to the DOS shell and to user-supplied disk manager, text editor, and spread sheet programs. Paths to these programs are specified under the SETUP/QUIT main menu item of the Shell (see Chapter 13 in this section.)

OPERATING SYSTEM

To access the "Operating System" menu option under the TOOLS main menu item, highlight TOOLS and then press the <O> key or move the highlight bar with the arrow keys to “Operating System" and press the <ENTER> key.

The purpose of the “Operating System" menu option is to allow users to go to the DOS operating system prompt while DSSAT v3 remains in memory. Note that DSSAT v3 requires about 100K of memory, and DOS operations that require large amounts of memory may be affected when this operation is done. Users must type “EXIT” and then press the <ENTER> when they wish to return to DSSAT.

DISK MANAGER

To access the "Disk Manager" menu option under the TOOLS main menu item, highlight TOOLS and then press the <D> key or move the highlight bar with the arrow keys to “Disk Manager" and press the <ENTER> key.

The purpose of the “Disk Manager" menu option is to enable access to a user’s disk manager program. If one is not installed, an error message will be displayed. To install a disk manager, use the option “Tools” under the SETUP/QUIT Shell option.

EDITOR

To access the "Editor" menu option under the TOOLS main menu item, highlight TOOLS and then press the <E> key or move the highlight bar with the arrow keys to “Editor" and press the <ENTER> key.

The purpose of the “Editor" menu option is to allow access to a user’s text editor program. If you have not installed an editor under the SETUP/QUIT Shell menu option, “Tool,” the editor supplied with DSSAT v3 will be accessed.

SPREADSHEET

To access the "Spread Sheet" menu option under the TOOLS main menu item, highlight TOOLS and then press the <S> key or move the highlight bar with the arrow keys to “Spread Sheet" and press the <ENTER> key.

The purpose of the “Spread Sheet" menu option is to allow access to a user’s spread sheet program. If one is not installed, an error message will be displayed. To install a spread sheet, use the option “Tools” under the SETUP/QUIT Shell option.

CHAPTER THIRTEEN.
SETUP/QUIT MENU OPTIONS

Under the SETUP/QUIT main menu item are options that enable users to to modify program paths, program names, and data file paths used in the different sections of DSSAT v3 These menu options allow users to tailor the DSSAT v3 package to their own disk configurations and to have more than one path on the computer with data or models that may be "linked" to DSSAT v3 at any desired time. For example, users may have weather data in two paths for two different regions. Then, the path definition under the SETUP/QUIT section can be set to the path required for a specific set of runs. It is also possible for users to have more than one model of the same crop and select the model they want run run by specifying its path and name under the SETUP/QUIT menu item.

Use the options under this main menu item to set up the paths of the major sections of DSSAT v3; that is, DATA, MODELS, ANALYSES, TOOLS, to save the modified configuration, and to quit DSSAT v3.

SETUP

To access the "Setup" menu option under the SETUP/QUIT main menu item, highlight SETUP/QUIT and then press the <S> key or move the highlight bar with the arrow keys to "Setup" and press the <ENTER> key.

DATA, MODELS, ANALYSES, TOOLS AND SAVE

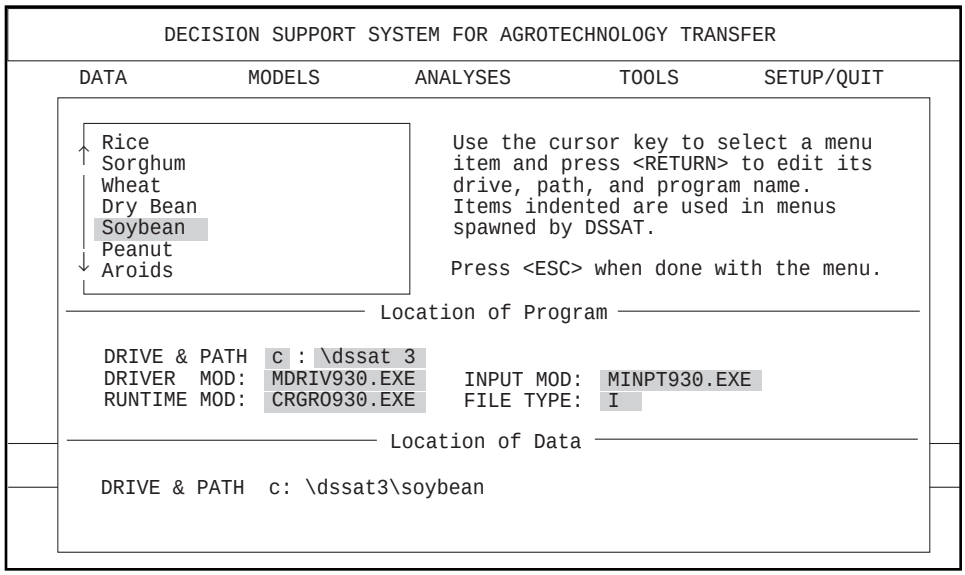
The purpose of the "Data," "Models," "Analyses" and "Tools" menu options is to allow users to change the drive and path, or location, of a particular program under each one of these main menu options and/or to change the drive and path of specific data locations. The "Save" menu option, saves any drive and path changes made.

Select one of these items by highlighting and pressing the <ENTER> key or by pressing the <D>, <M>, <A>, <T> or <S> key, respectively. The "Save" option would generally be used after location changes have been made to a program or data file using the first four menu options.

It should be noted that a file containing the setup configuration, named DSSATPRO.FLE, is rewritten each time the SAVE option is selected. This file MUST be in the path C:\DSSAT3. This is the ONLY path that must be on disk C:; all other files

may be on other disks. Users should make a backup of this file after selecting the total configuration on a system. The contents of the DSSATPRO.FLE file can be found in the Appendix to this volume.

Since the screens accessed for "Data," "Models," "Analysis" and "Tools" are similar, only the screens for "Models" will be shown to demonstrate the operation of these menu options.



SCREEN 69.

When "Models" is selected, Screen 69 (above) will be presented. In the top lift-hand window will be listed the crop models in DSSAT v3. Directions for selecting one of the items listed in this window are written on the screen to the right of this window. When an item is selected, the middle window of this screen, containing the drive and path name and other items for the particular program selected, as well as the bottom window for the drive and path name for data location, will be highlighted. To change any of the highlighted items, type in the highlighted areas. Any changes you make under the SETUP menu option will be saved only until you exit DSSAT v3.

To save your changes so they are available when you next open DSSAT v3, you must use the "Save" option under the SETUP menu item after you have made the changes.

QUIT

To "Quit" DSSAT v3, highlight SETUP/QUIT and then press the <Q> key or move the highlight bar with the arrow keys to "Quit" and press the <ENTER> key.

VOLUME 1-4

CREATING MANAGEMENT FILES TO RUN MODELS & DOCUMENT EXPERIMENTS

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CHAPTER ONE.
INTRODUCTION

Researchers in the IBSNAT network have developed a system of data files, formats, and conventions for storing information on crop production. The purposes of this system are to 1) provide a uniform structure for documenting crop experiments conducted at any site and 2) provide uniform data structures for crop model inputs and applications. This system includes files for daily weather, soil, crop and management data for documenting the environment, crop and cultivar characteristics and field management. These data files are also used as input to crop models. Other files are used to store measurements of crop, weather and soil responses during a season and at harvest, which are useful for evaluating the ability of the crop models to simulate real world responses.

The program which creates management files to run models and document experiments is called XCreate and was developed to help users create a file that describes an experiment. This file, referred to as FILEX, can be used to store details for an actual or hypothetical experiment in a standard ASCII file. For a detailed description of FILEX, see Volume 2-1 (Jones et al. 1994) of this book.

XCreate guides users through the complexities of entering various types of management information, and it stores the information in a FILEX that conforms exactly to the DSSAT v3 standard input/output specifications. It does not, however, provide capabilities for creating the other input files, such as soil, weather and crop performance data, which are needed to run the DSSAT v3 crop models.

XCreate can be used to enter data from actual experiments or from hypothetical ones that are to be simulated on a computer. A user can create a FILEX for running the DSSAT v3 crop models in three modes. These are:

1. Interactive or Experiment mode.
2. Seasonal analysis mode.
3. Sequencing analysis mode.

There are slight differences between the contents (but not the structure) of the FILEXs for these three modes of running the crop models. These differences are explained below. For a detailed description of the Seasonal and Sequence programs and their operation, see Volumes 3-1 and 3-2 (Thornton et al. 1994 (a and b)), respectively, of this book.

Interactive Mode

The Interactive (or Experiment) mode for running the crop models will usually be used for calibration, validation and sensitivity analysis; in other words, when you want to run single-season crop simulations, compare simulated with observed outputs, and investigate simple "what if" questions, such as what would happen if in 1993 you had grown variety A rather than variety B in this particular field trial. These model runs are made under the MODELS menu item of the DSSAT Shell, and the experiment FILEXs may involve many treatments that are replicated or not replicated across different weather seasons. Though, however many treatments there are, they all relate to one crop and hence to one crop model. Interactive changes to the model input data (as defined in FILEX) may be made, and many different options may be changed for each model run in this mode. Much output from the crop model can be written to the screen as well as to the output files, allowing the user to investigate simulation runs in great detail.

Seasonal Analysis Mode

Running the crop models in Seasonal Analysis mode is done under the ANALYSES menu item of the DSSAT v3 Shell. In contrast to Interactive mode, there is no provision for performing sensitivity analysis: to change the variety, for example, the FILEX has to be edited using the XCreate program or an ASCII text editor. Seasonal Analysis, however, allows you to run large experiments with many treatments replicated across many years of simulated or historical weather data. Furthermore, the results can be analyzed by comparing the treatments or "strategies" with respect to a wide variety of model outputs, such as yield. Economic comparison of the treatments can also be made, allowing the user to draw tentative conclusions concerning the economic risk associated with each treatment. The only differences between a FILEX created for interactive mode and one created for seasonal analysis mode will generally relate to the number of replicates and the possibility of using different crops (comparing the performance of soybean and maize, say, under the same environmental conditions). Any FILEX created for interactive mode can also be used in seasonal analysis mode. A user can modify an experiment FILEX to create a seasonal analysis FILEX by changing the number of years from '1' to 'n', where 'n' is the number of replications. For a complete description of the Seasonal program, see Volume 3-1 (Thornton et al. 1994 a) of this book.

Sequence Analysis Mode

Sequence Analysis mode, like Seasonal Analysis, involves running the crop models under the ANALYSES menu of the DSSAT v3 Shell. In this mode, crop rotations or sequences can be simulated, along with the attendant carry-over effects of soil water and nitrogen processes from one crop to another, including some fallow periods. These rotations can also be replicated with respect to different weather sequences. The method of setting up a FILEX for a sequence experiment (like the other modes, it may be a recorded or hypothetical experiment) is a little different. Instead of defining a complete set of treatments, the rotation "germ" or repeating unit is specified in FILEX, and the appropriate crop models will be run such that the germ is repeated over and over again until a specified number of years of simulated time has elapsed. The results of the sequence simulation can be analyzed with respect to model outputs and the economics of particular rotations or sequence "strategies." Sequence analysis FILEXs can not be used in any other mode because of the different way in which treatments are specified in the file. For a complete description of the Sequence program, see Volume 3-2 (Thornton et al. 1994 b) of this book.

CHAPTER TWO.
PROGRAM OVERVIEW

XCreate is, in essence, an experiment data entry program for DSSAT v3 and as such allows the user to enter management information for the various treatments and sections of an experiment. The information includes cultivar, field, soil analysis, initial conditions, planting, irrigation, fertilizer, residue, chemical applications, tillage and rotation, environmental modifications, harvest and simulation control conditions.

The basic procedure involved in creating a FILEX is as follows:
1. Select an existing experiment as a "template."
2. Add or Remove treatments.
3. Edit sections as required until complete.
4. Save the new FILEX.

A user can also start with a blank "template" and enter all treatment data and information needed to describe the details of an experiment.

GUIDELINES

A user can also start with a blank "template" and enter all treatment data and information needed to describe the details of an experiment.

General

XCreate was developed using Borland C++[1] and TurboVision[1] for the user interface routines. In general, the user interface is made up of menus, windows and dialog boxes. The user interacts with the program via menus and dialog boxes. The program displays information for the user via windows. Both mouse and keyboard commands can be used in this program.

Screen "Buttons"

In all XCreate screens, where multiple buttons are available (e.g., the SELECT, VIEW, NEW EXPT, CANCEL buttons in Screen 3 in Chapter 3), you may "press" these by one of two methods:

1) If using a mouse, click on the button.
2) If using the keyboard, highlight the button using the <TAB> and <SHIFT> <TAB> keys and then press the <ENTER> key.

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[1]Borland C++ and TurboVision are registered trademarks of Borland International, Inc.

CODES

Abbreviations or codes are used in various places in the experiment files (FILEXs). For example, codes are used for fertilizer types, pesticide types, crops, residue types, methods for applying fertilizers, irrigation methods, soil texture, tillage implements and environment modification flags. These codes are contained in a file named CODES.FLE which is described in Appendix B of Volume 2-1 (Jones et al. 1994) of this book. XCreate opens this file and presents the codes and their descriptions to users at appropriate places, to facilitate the ease with which correct data can be entered for an experiment.

To obtain code lists in XCreate, the user must press the <F2> key when the blinking cursor is on a data field that requires a code.

Users could add new codes to the CODES.FLE file, as needed, to document an experiment. However, current crop models may not recognize new codes.

KEYBOARD COMMANDS

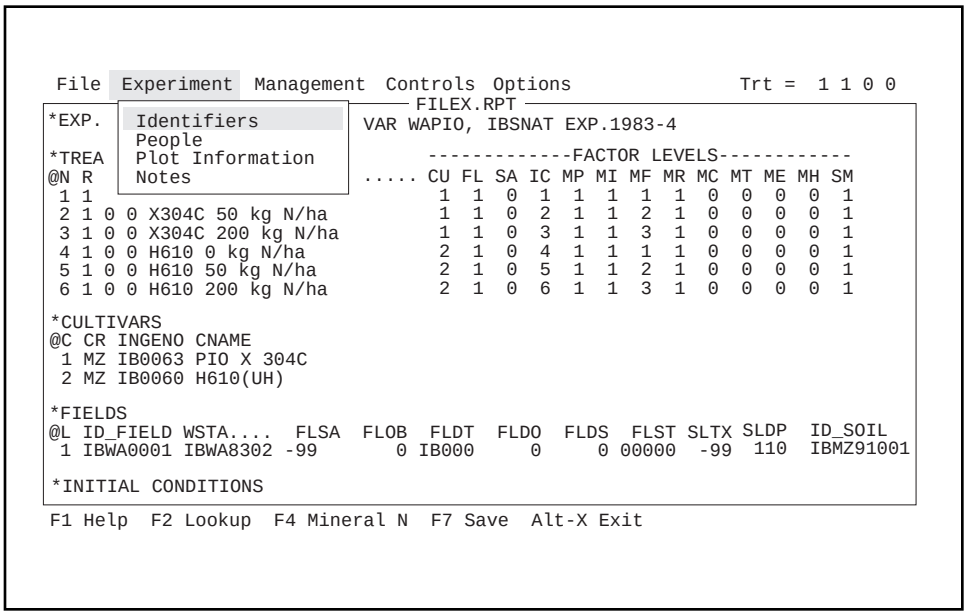
Following is a list of keyboard commands that can be used in most screens presented in the XCreate program.

<ESC>	Cancel/Exit the current dialog box or menu.
<F1>	Context sensitive help.
<F2>	Code selection list, if any.
<F4>	Set initial soil, water and mineral N conditions.
<F7>	Save edited file.
<TAB>	Move to the next data entry field or dialog item.
<SHIFT>-<TAB>	Move to the previous data entry field dialog item.
Up Arrow	Move up a list of items.
Down Arrow	Move down a list of items.
Alt-_	Shortcut keyboard command where "_" is the **BOLD** letter of a

menu item or button. (For example, Alt-F accesses the FILE menu item in the menu bar.)

Alt-X — Exit/Quit XCreate (To save a created file, users must press the <F7> key before exiting.)

SCREEN DISPLAY



SCREEN 1.

Screen 1 is a typical XCreate screen. The top line, with FILE, EXPERIMENT, MANAGEMENT, CONTROLS and OPTIONS is the menu bar. Each item in this menu bar has a related pull-down menu. To access a pull-down menu click on the menu item with the mouse or press "Alt-_" where "_" is the first letter of the menu bar item. (i.e., Alt-F for the "File" menu bar item).

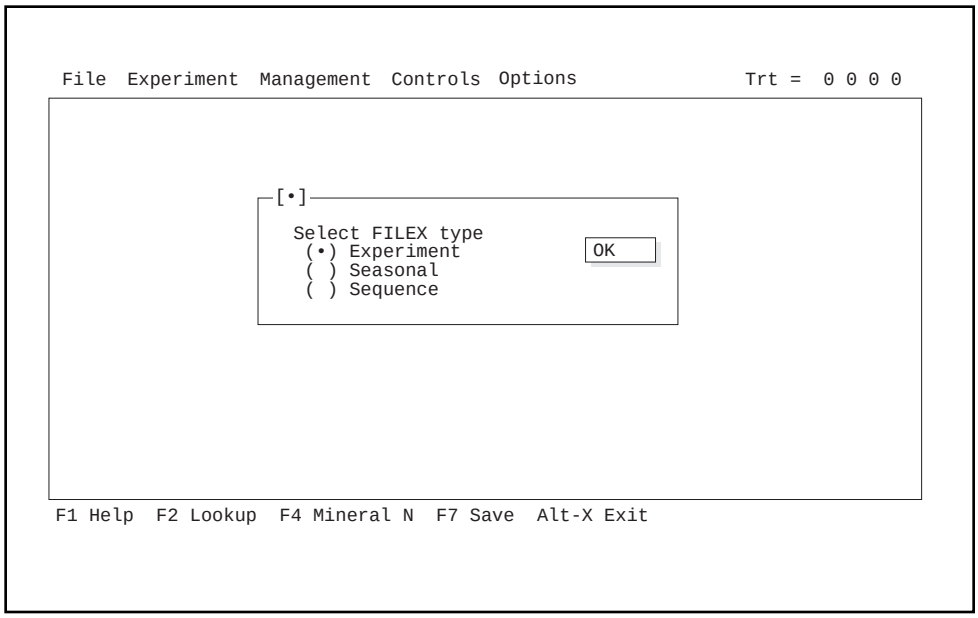
The bottom line of the screen, with "F1 Help," "F2 Look up," "F4 Mineral N," "F7 Save" and "Alt-X Exit," is called a status line. The status line contains short-cut key commands to certain functions available in the menu bar. For example, to save your experiment, you can either press <F7>, referring to "F7 Save" in the status line, or select the "File" menu in the menu bar and then select the "Save current work" menu item.

Immediately below the menu bar is a scrollable text window with the heading “FILEX.RPT.” This window displays the current state of the experiment description file (FILEX) being created or modified. To scroll within this window, close all pull-down menus by pressing the <ESC> key. Use the arrow keys to scroll. You may also turn off this window by opening the “Options” menu bar item and selecting “Toggle report window.” Select “Toggle report window” to turn the report window on again.

In the upper right-hand corner of every XCreate screen, there is a colored area with “Trt = A B C D” in it, for example, in Screen 1, Trt=1 1 0 0. This Selected Treatment Indicator is used to denote which treatment is being modified in an experiment. The “A” indicates the current Treatment Number, “B” and “C” indicate the Rotation Component and Rotation Option, respectively, and “D” indicates the Crop Component. See Chapter 6 for a more detailed description of the Selected Treatment Indicator.

CHAPTER THREE.
EXECUTE PROGRAM

To access the XCreate program under the DATA main menu item, highlight DATA and then select the “X Experiment” option by pressing the <X> key or by moving the highlight bar with the arrow keys to the “X Experiment” option and pressing the <ENTER> key. From the “X Experiment” menu, select the “C Create” option. The following screen will appear.



SCREEN 2.

In Screen 2, you may select to create an “Experiment,” “Seasonal” or “Sequence” FILEX.

1. Select "Experiment” to document a single-season recorded experiment.
2. Select "Seasonal” to create an experiment that is repeated for a number of years. Usually this FILEX is created to analyze the effect of a particular management strategy over multiple seasons. See Volume 3-1 (Thornton et al. 1994 a) of this book for a description of the Seasonal program.
3. Select “Sequence” to create a sequence analysis experiment This FILEX is used to analyze the effect of crop rotations or crop sequencing. See Volume 3-2 (Thornton et al. 1994 b) of this book for a description of the Sequence program.

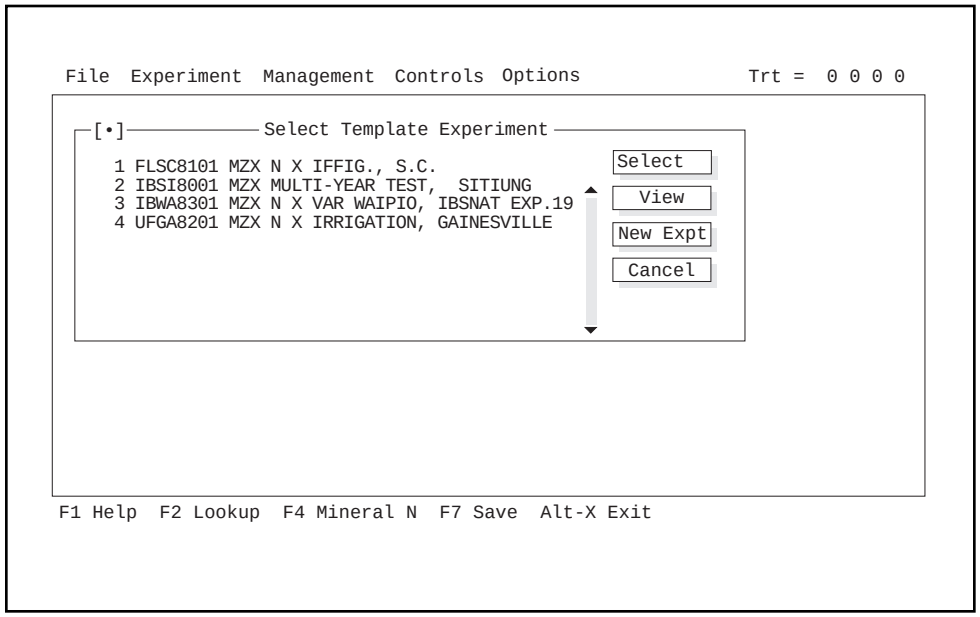
To create an Experiment FILEX: Select "Experiment" by moving the (•) selector to "Experiment" using the arrow keys. Either press the <ENTER> key or use the mouse to click on the OK button.

To create a Seasonal FILEX: Select "Seasonal" by moving the (•) selector to "Seasonal" using the arrow keys. Either press the <ENTER> key or use the mouse to click on the OK button.

To create a Sequence FILEX: Select "Sequence" by moving the (•) selector to "Sequence" using the arrow keys. Either press the <ENTER> key or use the mouse to click on the OK button.

To exit XCreate: Press <ESC> and then ALT-X..

After you have made a selection to create a FILEX (either Experiment, Seasonal, or Sequence) Screen 3 (below) will appear.



SCREEN 3.

In Screen 3, you can choose to create a new experiment using an existing experiment as a template or to enter a new experiment without a template.

To select an existing experiment as a template: Scroll through the list of experiments with the scroll bar. Move the highlight bar over the experiment you wish to use as a template and press the SELECT button. Using this option to enter an experiment may be the quickest and easiest way if one of the experiments shown in this dialog box is similar to your experiment. XCreate allows you to load the existing experiment, make any modifications necessary to various sections and then save it as a new experiment.

NOTE:*If you are already in the process of editing an experiment and have not saved it, loading a new one from this dialog box will completely ERASE your current work.*

To view an existing experiment: Move the highlight bar over the experiment, using the arrow keys or mouse, and press the VIEW button. A scrollable text window will pop up with the contents of the VIEWed experiment within it. Press the <ESC> key to close the VIEWing window.

To create a new experiment: Press the NEW EXPT button. Use this button if there are no templates you would like to select or if you want to define a completely new experiment.

To cancel: Press the CANCEL button. Use this button if you do not want to create a new experiment and want to keep the current experiment, if any, that you were editing.

Tips For Creating A New Experiment (Real Or Hypothetical) & For Editing Existing

Adding a New Experiment

1. Under the EXPERIMENT main menu item, select the "Identifiers" menu option. Enter the Experiment ID and crop group, which will create the unique name for this experiment (e.g., UFGA7801 for the ID and SB for the crop group creates the file UFGA7801.SBX).
2. Go to the MANAGEMENT main menu item and select the "Treatments" menu option. Press the ADD TRT button to create the first treatment of the experiment. Enter the name of the treatment.
3. Enter all information for Treatment 1, including all information about fields, planting, cultivars, irrigation, etc. Also, under the CONTROLS main menu item, select the "General" menu option and enter the "Simulation Start Date." ***NOTE:*** *Press the ADD LVL button each time information is added in the CONTROLS section.*

4. Then, select the "Treatments" option again under the EXPERIMENT main menu item, and press the ADD TRT button to add the second treatment. Name this treatment. This treatment will automatically be given the values of the first treatment as starting values.
5. Select only each management item (e.g., cultivar, planting, fields, etc.) for the second treatment that is different from the first. Enter correct information for the second treatment for each of the management items which are different and press the ADD LVL button to save this new management information for the second treatment. Note that the number "2" will appear in the first position in the Selected Treatment Indicator found in the upper right-hand corner of the screen
6. Continue to add treatments in this way, making sure that all information for a particular treatment is correct before proceeding to the next one. You can use the arrow keys or mouse to highlight any of the previous treatments before pressing the ADD TRT button. This will select the values from that treatment for the new one to be added, so that only one factor will usually have to be added (using the ADD LVL button) for each treatment in a factorial experiment.

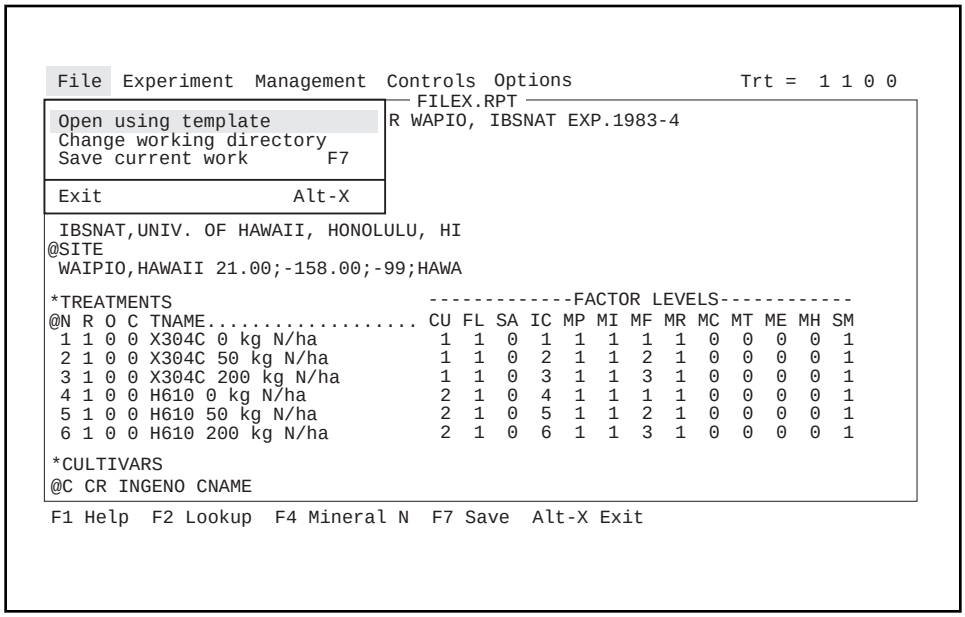
Editing an Existing Experiment

1. If the edited file is to replace the existing file, there is no need to change the Experiment ID. However, if you wish to keep the existing file and enter new data for another file, change the ID using a name under which you wish the information to be stored. (See item #1 under the above section "Adding a New Experiment.")
2. Start with Treatment 1, and make all of the modifications to this treatment that you wish to make. Press the OK button to replace existing information with the information that is entered for the first treatment.
3. Proceed to the second treatment, changing everything that needs to be changed. It is best to use the ADD LVL button for each change to make sure that the change that is made is only for the treatment being edited. If duplicate information is found by the software, it will be recognized and corrected.
4. Continue to successive treatments, and check the information behind the menus to be sure that treatments are being correctly created.

CHAPTER FOUR.

FILE MENU

Under the FILE menu item (Screen 4 below) are options which enable users to create a new experiment using an existing experiment as a template or to enter a new experiment without a template, to change the working directory and to save a newly created FILEX.



SCREEN 4.

OPEN USING TEMPLATE OPTION

This option allows the user to create a new experiment by selecting an existing experiment as a template or a completely new experiment without a template. See Chapter 3 for more information about this option.

CHANGE WORKING DIRECTORY AND SAVE CURRENT WORK OPTIONS

To change the current working directory: In Screen 4, select the "Change working directory" menu item. This will enable you to change the directory in which XCreate looks for and saves X files.

To save your experiment: Select the "Save current work" menu item. This allows you to save your FILEX to the current working directory. If you try to save the file and its name does not contain the institute ID, site ID and experiment number information (i.e., INSIEXNO), a message will appear on the screen. You must enter this information under the EXPERIMENT menu (see Chapter 5). The DSSAT v3 file naming convention is described in Volume 2-1 (Jones et al. 1994) of this book.

CHAPTER FIVE.

EXPERIMENT MENU

Under the EXPERIMENT menu (Screen 5 below) are several options that allow you to enter or modify data that will be stored in the EXPERIMENT section of a FILEX.

```
 File  Experiment  Management  Controls  Options                Trt =  1 1 0 0
┌──────────────────────────────── FILEX.RPT ──────────────────────────────────[ ]
*EXP.  Identifiers                X VAR WAPIO, IBSNAT EXP.1983-4
       General
*TREA  Plot Information                 -------------FACTOR LEVELS------------
@N R   Notes                     ..... CU FL SA IC MP MI MF MR MC MT ME MH SM
 1 1                                    1  1  0  1  1  1  1  1  0  0  0  0  1
 2 1 0 0 X304C 50 kg N/ha               1  1  0  2  1  1  2  1  0  0  0  0  1
 3 1 0 0 X304C 200 kg N/ha              1  1  0  3  1  1  3  1  0  0  0  0  1
 4 1 0 0 H610 0 kg N/ha                 2  1  0  4  1  1  1  1  0  0  0  0  1
 5 1 0 0 H610 50 kg N/ha                2  1  0  5  1  1  2  1  0  0  0  0  1
 6 1 0 0 H610 200 kg N/ha               2  1  0  6  1  1  3  1  0  0  0  0  1

*CULTIVARS
@C CR INGENO CNAME
 1 MZ IB0063 PIO X 304C
 2 MZ IB0060 H610(UH)

*FIELDS
@L ID_FIELD WSTA....  FLSA  FLOB  FLDT  FLDO  FLDS  FLST SLTX SLDP  ID_SOIL
 1 IBWA0001 IBWA8302 -99       0 IB000     0     0 00000  -99  110  IBMZ91001

*INITIAL CONDITIONS
└─────────────────────────────────────────────────────────────────────────────┘
 F1 Help  F2 Lookup  F4 Mineral N  F7 Save  Alt-X Exit
```

SCREEN 5.

These four menu options are briefly described below.

The “Identifiers” menu option allows you to name the experiment, assign an eight character experiment identifier, define the crop group and provide an experiment name. It is suggested that the experiment name be composed of a short name (with no blanks); followed by a blank space; a brief summary of treatment factors; a blank space; and a local abbreviation (if any) for the experiment, enclosed by parenthesis.

The “General” menu option allows you to enter information that identifies the people that were involved with this experiment, their addresses and general sit information. This information is written to three lines in the file: Name of

People; Addresses; and Site. The line containing site information should consist of a short site name (with no blanks); followed by a blank space; then latitude; longitude; altitude of site; and climate zone; the latter four items separated by semicolons. For example:

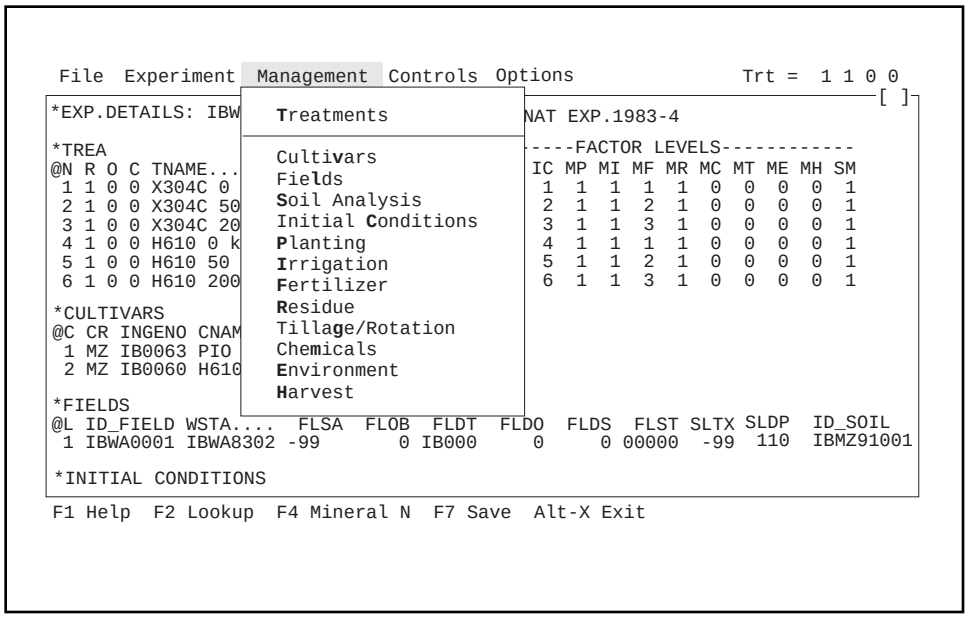
GAINESVILLE, FL 29.6F3N;82.37W;40M;FLORIDA

The "Plot Information" menu item allow you to enter information that defines the plot on which this experiment was carried out.

The "Notes" menu option allows you to enter up to five lines of notes and any other information that may be helpful in describing this experiment.

CHAPTER SIX.
MANAGEMENT MENU

Under the MANAGEMENT menu (Screen 6 below) are several management options to enable a user to define management-related information for the FILEX. See Volume 2-1 (Jones et al 1994) of this book for a complete description of these options.



SCREEN 6.

TREATMENTS OPTION

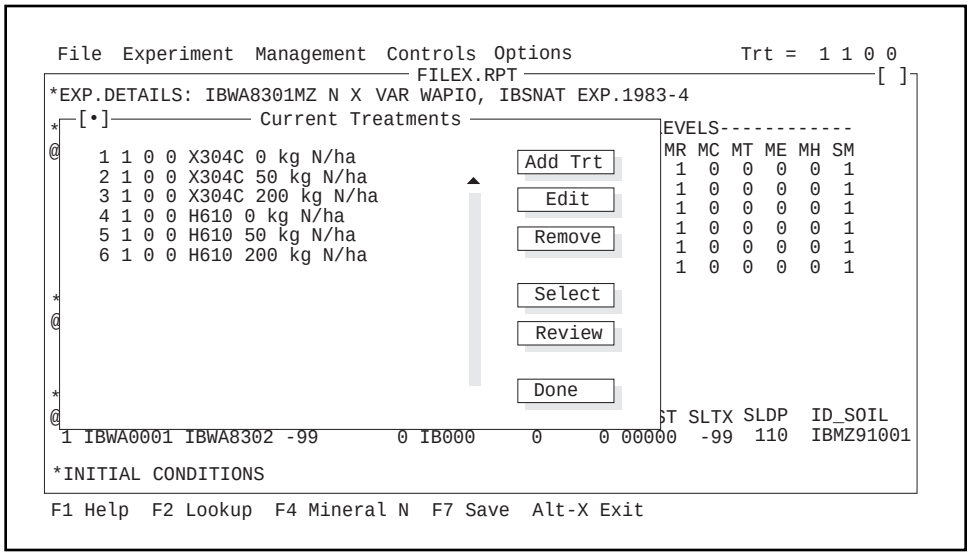
The "Treatment" option is most important. From it, you may select an existing treatment, define a new treatment, edit an existing treatment or remove an existing treatment.

SELECTED TREATMENT INDICATOR

In the upper right-hand corner of every XCreate screen, there is a colored area with "Trt = A B C D" in it. This Selected Treatment Indicator is used to denote which treatment is being modified in an experiment. The "A" indicates the current Treatment Number, "B" and "C: indicate the Rotation Component and Rotation Option, respectively, and "D" indicates the Crop Component. In Screen 6, "A" = 1, "B" = 1, "C" = 0 and "D" = 0.

XCreate will display Treatment 1 of a selected experiment, as the default treatment, whenever a new experiment is loaded, as indicated in the top right hand corner of this screen by the Selected Treatment Indicator (i.e., Trt = 1 1 0 0 in Screen 6). This treatment could then be deleted or edited.

The Selected Treatment Indicator is vital when editing any management section of an experiment (e.g., "Cultivars," "Fields" etc.). The edit operation allows you to change management used for the particular treatment and any other treatment that uses this level of management. (Please note that the term "level" used throughout is identical to treatment levels used in experiments.) Consider the example shown in Screen 7 (below) in which Treatments 3 and 6 have 200 kg N/ha applied fertilizer. To change the fertilizer application in Treatment 3 to 50 kg N/ha, select Treatment 3 under the "Treatments" menu option (see "Treatment Dialog Box" below). When you do this, the Selected Treatment Indicator will change from "Trt = 1 1 0 0," as seen in Screen 7, to "Trt = 3 1 0 0". Next, when you open the "Fertilizer" menu option, you will be asked whether or not you want to create a new, unique fertilizer management level. Since Treatments 3 and 6 both share the same management level, type "Y" if you want the fertilizer management level in Treatment 3 to differ from that of Treatment 6. Otherwise, type "N" to modify the fertilizer management level used by both treatments.



SCREEN 7.

TREATMENT DIALOG BOX

When "Treatments" is selected from the MANAGEMENT menu (see Screen 6),

the dialog box shown in Screen 7 (on preceding page) is presented. Use the scroll bar to move through this list, using a mouse or the arrow keys.

To change the selected treatment: Move the highlight bar over the treatment you want to select by using the arrow keys or mouse. Press the SELECT button.

To add a new treatment: Move the highlighted bar over the treatment you want to use as a template by using the arrow keys or mouse. Press the ADD Trt button. This allows you to create a new treatment by entering new data and add it to the experiment. The new treatment will initially have the same management as the highlighted treatment when you press the ADD Trt button.

To review an existing treatment: Move the highlight bar over the treatment you want to review by using the arrow keys or mouse. Press the REVIEW button.

To edit an existing treatment: Move the highlight bar over the treatment you want to edit by using the arrow keys or mouse. Press the EDIT button.

To remove an existing treatment: Move the highlight bar over the treatment you want to delete by using the arrow keys or mouse. Press the REMOVE button. Please note that when you delete a treatment, you will also delete all management and control information related to that treatment which is not referenced by some other treatment.

NOTE 1: *In running crop models in Experiment mode, or single season non-sequencing experiment mode, you need only increment Treatment Numbers (N), leaving the Rotation Component Number (R) at the fixed value of 1.*

NOTE 2: *In running crop models in Seasonal Analysis mode, or replicating treatments across years mode, each season is numbered only by Treatment Number (N). The Rotation Component (R), Rotation Option (O), and Crop Component (C) are all set to fixed values.*

NOTE 3: *In running crop models in Sequencing Analysis mode, or crop rotation or sequence mode, each sequence would have a single Treatment Number (N). Each crop in the sequence would then be numbered by the Rotation Component Number (R). The Rotation Option Number (O) is used to indicate if there is an alternative crop in the sequence. For example, a three-stage rotation of maize, dry bean (with wheat as an alternative) and rice, with each crop followed by a fallow period, would be set up like this:*

N	R	O	C	
1	1	1	0	Maize
1	2	1	0	Fallow
1	3	1	0	Dry Bean
1	3	2	0	Alternate Wheat Crop
1	4	1	0	Fallow
1	5	1	0	Rice
1	6	1	0	Fallow

NOTE: *All stages in the same sequence are numbered as Treatment 1, but the Rotation Component Numbers(R) are incremented. Also NOTE the Rotation Option Numbers (O) for the dry bean and alternate wheat crops. Crop Component (C) values are fixed at 0 (zero) by Xcreate because this concept is not yet implemented by the DSSAT v3 crop models.*

The data input dialog boxes for "Cultivars," "Fields," "Planting," "Residue," "Tillage/Rotation", "Chemicals" or"Harvest" options are similar. Thus, only the screen dialog box presented for "Fields" (Screen 8) will be illustrated for these Management menu options. The data required appear on a single screen as shown in Screen 8 (on the following page).

Move forward through data fields by pressing the <TAB> key and move back-

CULTIVARS, FIELDS, PLANTING, RESIDUE, TILLAGE/ROTATION, CHEMICALS AND HARVEST OPTIONS

ward by pressing the <SHIFT> <TAB> keys. Any default or current values for a particular field are shown in brackets to the left of the data input field.

These seven menu options are briefly described as follows.

The "Cultivars" menu option allows you to specify crop and cultivar information for the default treatment.
The "Fields" menu option allows you to enter weather, soil and field description details.

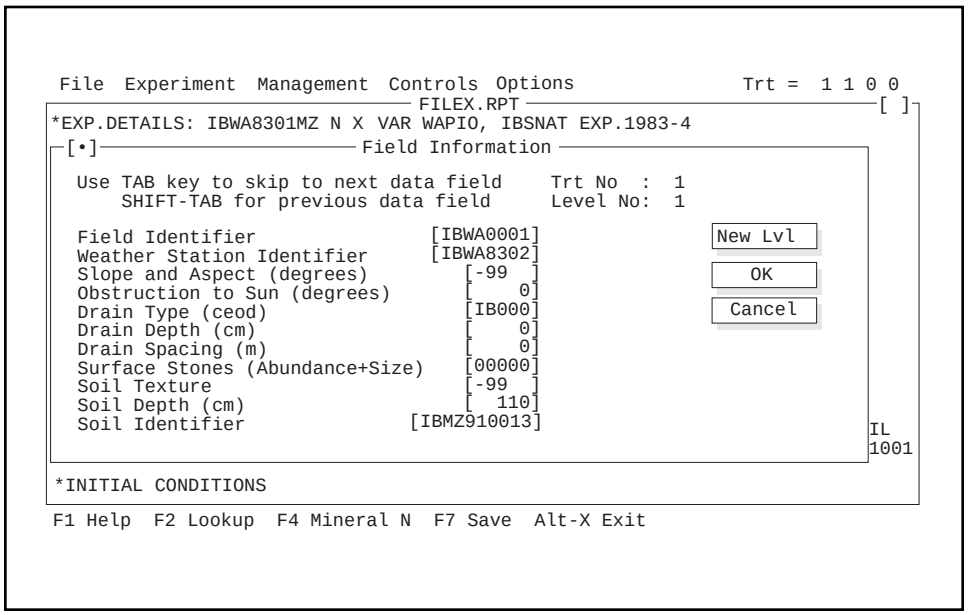
The "Planting" menu option allows you to specify planting date, population, seeding depth, and row spacing data.

The "Residue" menu option allows you to specify additions of straw, green manure and animal manure.

The “Chemicals” menu option allows you to specify herbicide and pesticide application data.

The “Tillage/Rotation” menu option allows you to specify tillage date, implement and depth data.

The “Harvest” menu option allows you to specify information on harvest dates, plant components harvested and percentage of products harvested.



SCREEN 8.

FIELDS DIALOG BOX

Screen 8 (above) for the “Fields” menu option represents the dialog box that will be presented when you select one of these seven MANAGEMENT menu options. After making changes to the items on the screen, you can do the following.

To save your data: Press the OK button once you have completed entering data or press the NEW LVL button to create a new section with the current data.

To cancel any changes: Press the CANCEL button. This will cancel any changes you have made to data in this dialog box.

NOTE: *You may not remove CULTIVAR, FIELD or PLANTING information once it has been added to a treatment because these sections are required data for every treatment.*

Soil Analysis, Initial conditions and Irrigation Options

The data input dialog boxes for "Soil Analysis," "Initial Conditions" or "Irrigation" options are similar. Thus, only the screen dialog boxes presented for "Initial Conditions" will be illustrated (see Screens 9 and 10) for these Management menu options. Data for each of these options are made of two parts and are entered using two dialog boxes. In the first dialog box, enter data related to the option in general. In the second dialog box, enter data for one or more layers or the dates of application depending upon the option selected. Move forward through data fields by pressing the <TAB> key and move backward by pressing the <SHIFT><TAB> keys. Any default or current values for a particular field are shown in brackets to the left of the data input field.

These three menu options are briefly described as follows:

The "Soil Analysis" option allows you to enter the set of soil properties used for the simulation of nutrient dynamics, based on field nutrient sampling, if any. These properties are also contained in the soil profile data which may have been derived from a more general set of soil information.

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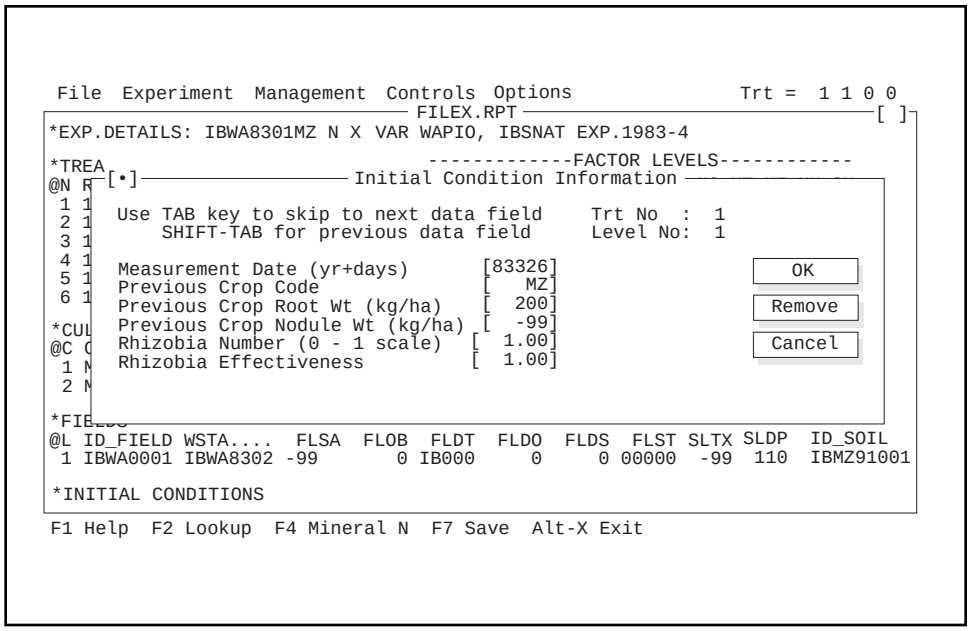
The "Initial Conditions" option allows you to specify starting conditions for water and nitrogen in the profile. It is also used for carry over of root residue from the previous crop and N symbiosis initialization details when needed.

The "Irrigation" option allows you to enter irrigation dates, amounts, thresholds and rice flood water depths.



SCREEN 9.

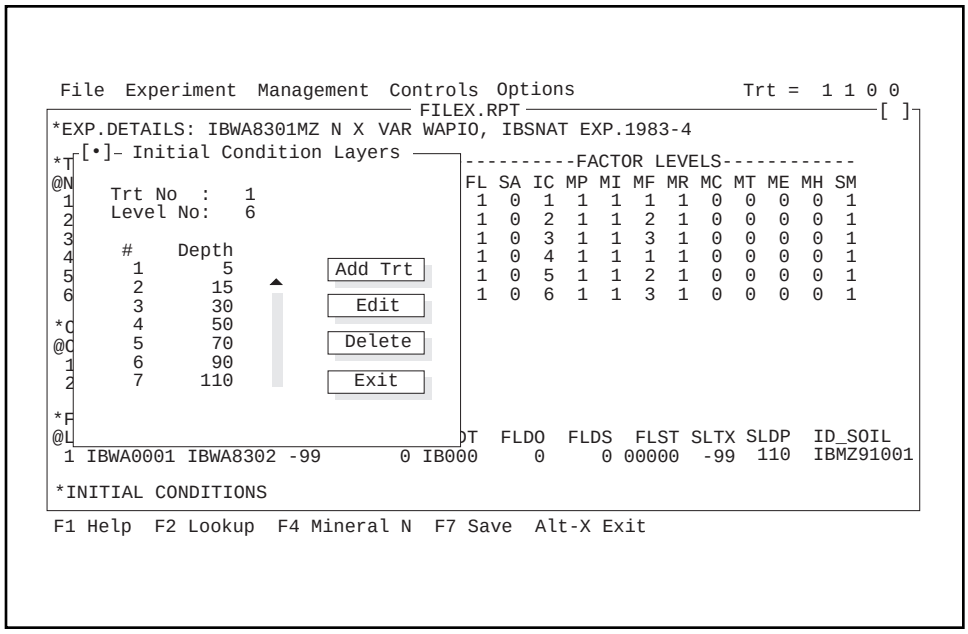
INITIAL CONDITIONS DIALOG BOX 1

Screen 9 (above) for the "Initial Conditions" menu option represents the first dialog box that will be presented when you select one of these three MANAGEMENT menu options. After making changes to the items on the screen, you can do the following.

To save your data and continue: Press the OK button. Once you have completed the first part, the next dialog box will appear and you may begin entering data for the rest of the section.

To remove a data section: Press the REMOVE button. This will erase the section from the current default treatment in the experiment.

To cancel any changes: Press the CANCEL button. This will cancel any changes you have made to data in this dialog box.



SCREEN 10.

Initial Conditions Dialog Box 2

Screen 10 (above) shows an example of the second dialog box for data entry into the "Soil Analysis," "Initial Conditions" and "Irrigation" options. It displays data for any existing layer or for dates of application in the left-hand scrolling list. After making changes to the items on the screen, you can do the following.

To add a new layer or date: Press the ADD button. A new dialog box will appear into which you may enter your data. The date must include a 2-digit year number, followed by the Julian day of year (e.g., "78" for the year; "170" for Julian day of year). Press the OK button in this box to save the data you have entered.

To edit an existing layer or date: Move the highlight bar over a layer or a date by using the arrow keys and press the EDIT button. A dialog box will appear in which you may edit your data. Press the OK button in this box to save your data. Press the CANCEL button to abort any changes you have made.

To delete an existing layer or date: Move the highlight bar over a layer or a date by using the arrow keys. Press the DELETE button.

To exit this dialog: Press the EXIT button. The information for this treatment will be modified based on the changes that you have made.

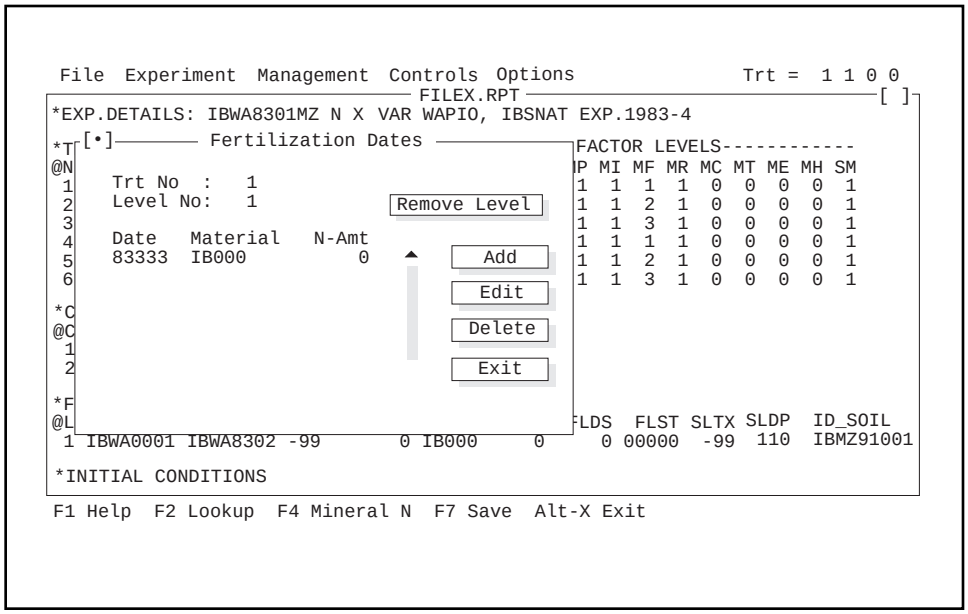
FERTILIZER AND ENVIRONMENT OPTIONS

The data input dialog boxes presented after the “Fertilizer“ or “Environment“ option is selected are similar. Thus, only a screen dialog box presented for “Fertilizer“ will be illustrated (see Screen 11 below) . The data input for these two sections are similar. All data required are entered using one dialog box. The data are made up of one or more dates of application or modification.

These two menu options are briefly described as follows:

The “Fertilizer” menu option allows you to enter fertilizer application level, date, type and depth data.

The “Environment” menu option allows you to specify any adjustment factors for weather parameters as used in climate change, controlled environment studies and growth chamber studies.



SCREEN 11.

FERTILIZER DATE DIALOG BOX

Screen 11 (above) for the “Fertilizer” menu option represents the dialog box that will be presented when you select one of these MANAGEMENT menu options. After making changes to the items on the screen, you can do the following.

To add a new application: Press the ADD button. A new dialog box will appear into which you may enter your data. When data entry is complete, press the OK button in that box to save your data. The date must include a 2-digit year number followed by Julian day of year (e.g., '78' for the year; '170' for Julian day of year). Press the CANCEL button to abort any changes you have made.

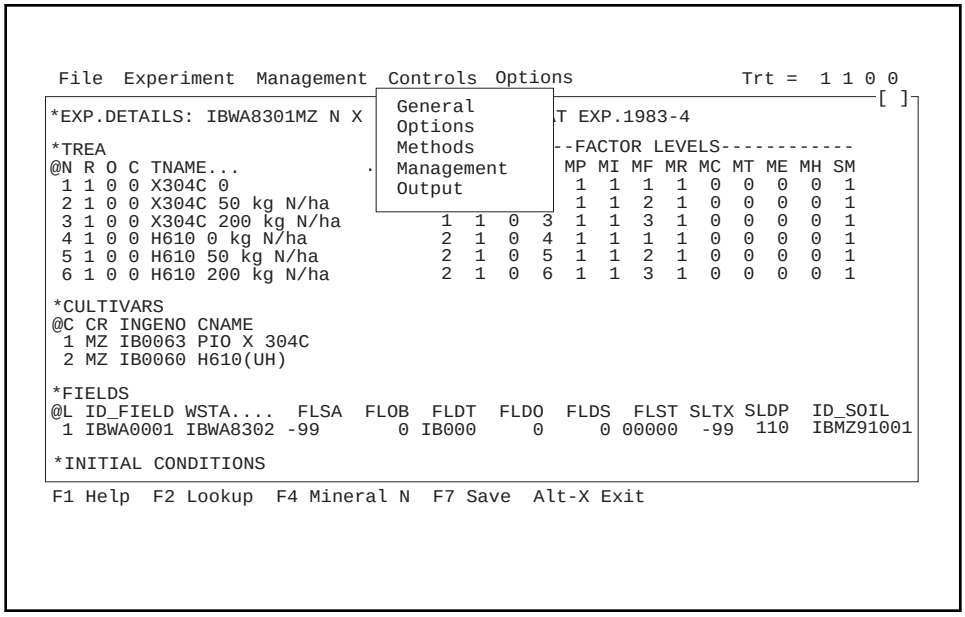
To edit an existing date: Move the highlight bar over the date by using the arrow keys and press the EDIT button. A dialog box will appear with which you may edit your data. Press the OK button in the box to save your data.

To delete an existing date: Move the highlight bar over the date by using the arrow keys. Press the DELETE button.

To exit this dialog: Press the EXIT button.

CHAPTER SEVEN.
CONTROLS MENU

The CONTROLS menu (Screen 12 below) allows you to set various Simulation Control options, including starting dates and on/off options for model components such as soil water or nitrogen balances for FILEX. This information is not necessary for documenting experiments, but it is needed to control the computer simulation of the experiment using crop models. For a description of these Simulation Controls and their use in FILEX, as well as a display of their structure and some examples, see Volume 2-1 (Jones et al. 1994) of this book.



SCREEN 12.

The data input dialog boxes presented after the “General,” “Options,” “Methods,” “Management” or “Output” is selected are similar. Thus, only the screen dialog box for "General” will be illustrated (see Screen 13, following). The data required appear on a single screen, under each option as shown in Screen 13.

Move forward through data fields by pressing <TAB> and move backward by pressing <SHIFT> and <TAB>. Any default or current values for a particular field are shown in brackets to the left of the data input field.

These five menu options are briefly described as follows:

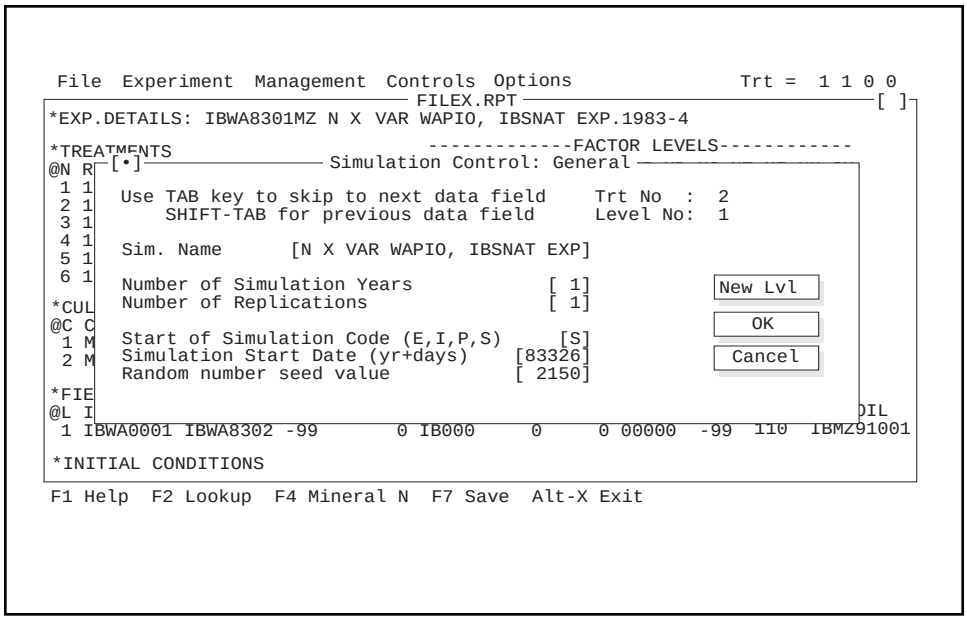
The “General” menu option allows you to specify control information that apply to the treatment in general. For example, number of simulation years, number of replications, start date and name for the simulation.

The “Options” menu option allows you to specify which crop model routines you want to turn ON or OFF for your simulation.

The “Methods” menu option allows you to indicate to the crop model the methods that should be used for computing processes such as evapotranspiration and photosynthesis in the crop model.

The “Management” menu option allows you to specify to the crop model whether different management operations, such as planting and irrigation, are to be based on reported data as input or are to be simulated internally based on automatic management options.

The “Output” menu option allows you to specify the frequency and the types of model outputs to create (such as summary, growth, water, nitrogen and pest).



SCREEN 13.

GENERAL SIMULATION CONTROLS DIALOG BOX

Screen 13 (above) for the "General" menu option represents the dialog box that will be presented when you select one of these five CONTROLS menu options. After making changes to the items on the screen, you can do the following.

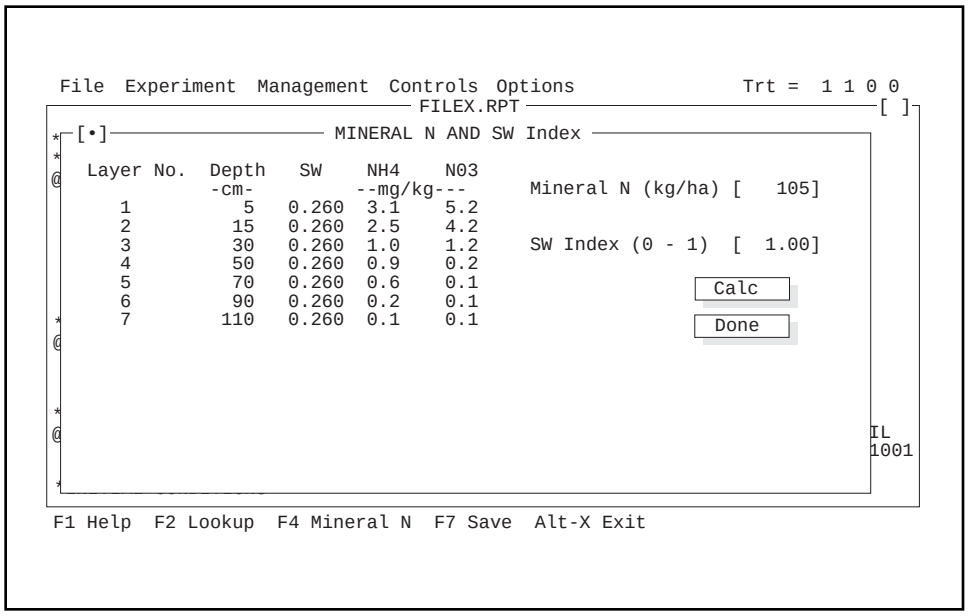
To save your data: Press the OK button once you have completed entering data or press the NEWLVL button to create a new section with the current data.

To cancel any changes: Press the CANCEL button. This will cancel any changes you have made to data in this dialog box.

CHAPTER EIGHT.
<F4> KEY: MINERAL NITROGEN AND SOIL WATER INITIAL CONDITIONS

In documenting an experiment or setting up a hypothetical experiment for crop model use, it is important to specify initial soil water and N conditions. If these data were not measured in the experiment, using the <F4> key allows you to estimate layer by layer values of water and nitrogen content by specifying overall mineral N in the field and relative soil water availability.

When the <F4> key is pressed, the dialog box shown in Screen 14 (below) is presented. In this screen you can create and modify soil water and soil nitrogen initial condition values by entering a mineral nitrogen value and/or a soil water index value.



SCREEN 14.

<F4> DIALOG BOX

To change the NH_4 and NO_3 values: Enter a value for total Mineral N. Press the CALC button. The current mineral N value is shown in the brackets just above the data field. XCreate will take the mineral N value and distribute the amount

among all the layers and between NH_4 and NO_3 values.

To change the SW values: Enter a SW value, from 0 - 1, which represents your estimate of the fraction of water in the soil relative to its water-holding capacity. Press the CALC button. The current SW Index value is shown in the brackets just above the data field. XCreate will use the entered SW Index value to recalculate the SW for each layer of the initial condition by multiplying the index by the available water in each layer.

To exit this dialog: When you have completed setting the initial conditions to your desired specifications, select DONE, and the changes will be saved.

VOLUME 1-5

CONVERTING FROM DSSAT V2.1 TO DSSAT V3 DATA FILES AND FORMATS

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CHAPTER ONE.
INTRODUCTION

The DSSAT program for converting from DSSAT v2.1 to DSSAT v3 data files and formats is called Convert andallows ther user to convert DSSAT v2.1 crop model input files (see Tech. Report 5, Documentation for IBSNAT Crop Model Input & Output Files, Version 1.1, IBSNAT 1986, for more information) for experiments, weather, and soil data to the new DSSAT v3 crop model input file formats.

Experiment Crop Model Input Files

This program will convert crop model input FILEs 4, 5, 6, 7, 8, A, B, C, and D of DSSAT v2.1 to the new FILE X, A and T formats of DSSAT v3. It will also automatically convert the soil data required to run the experiment being converted to v3.

Soil Crop Model Input File

This program will convert soil profile data in the SPROFILE.XX2, where XX is the crop code, of DSSAT v2.1 to the new soil file SOIL.SOL of DSSAT v3. You have the option to convert any or all of the soil profiles contained in the SPROFILE.XX2.

Weather Crop Model Input Files

This program can be used to convert ASCII weather data that is in DSSAT v2.1 IBSNAT format to the new DSSAT v3 ASCII weather data format. You have the option to convert any or all weather data stored in a particular directory.

Missing Data and Defaults

During the conversion of DSSAT v2.1 files to DSSAT v3 files, any missing values or new variables not defined in v2.1 will be replaced by a "-99" value. In general, a data set that worked in v2.1 will be sufficient to run in v3 with the default simulation control settings.

EXECUTE CONVERT PROGRAM

To access the Convert program under the DATA main menu item, highlight DATA and then select the "X Experiment" option by pressing the <X> key or by moving the highlight bar with the arrow keys to the "X Experiment" option and pressing the <ENTER> key. From the "X Experiment" menu, select the "U Utilities" option and then press the <C> key to open the Convert program. Screen 1 (below) will be presented.

```
Data Files Conversion from Version 2.1 to 3.0



                    SELECT DATA TO CONVERT

                    Weather Data
                    Experiment & Soil Data
                    Soil Data
```

SCREEN 1.

To convert weather data: Select "Weather Data" by moving the highlight bar using the arrow keys and press the <ENTER> key.

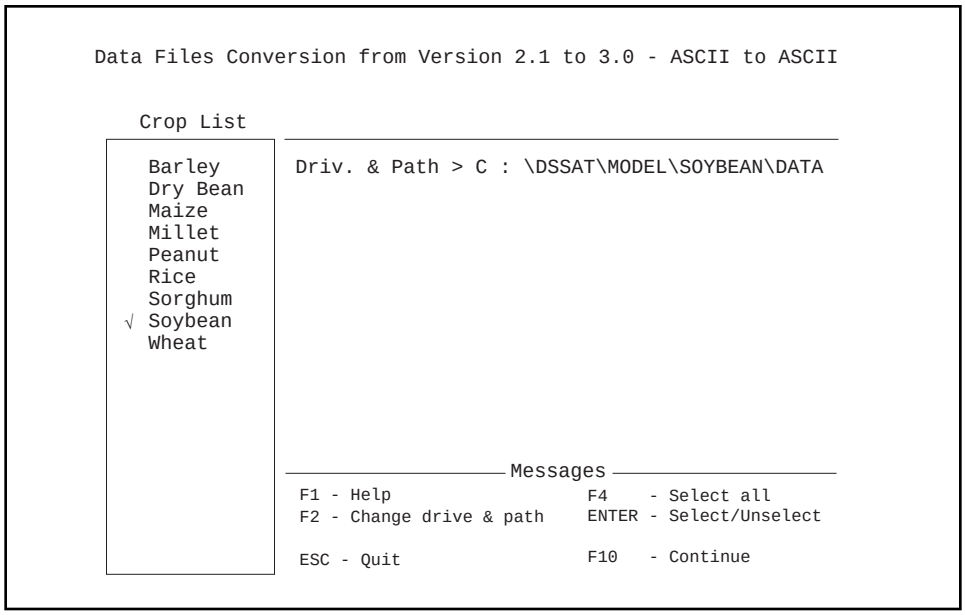
To convert experiment data: Select "Experiment & Soil Data" by moving the highlight bar using the arrow keys and press the <ENTER> key.

To convert soil data: Select "Soil Data" by moving the highlight bar using the arrow keys and press the <ENTER> key.

To exit Convert: Press the <ESC> key.

CHAPTER TWO.
WEATHER DATA CONVERSION

The Convert "Weather Data" option allows you to convert DSSAT v2.1 weather data sets to DSSAT v3 data formats. When this option is selected, Screen 2 (below) will be presented. A crop list is displayed because weather data were usually stored in each crop's data directory. Move through the list using the arrow keys. When a crop is highlighted,, the default drive and path of that crop are shown in the right hand window. Selecting a crop, also selects the drive and path displayed; the user, however, may change these. Weather data converted for any crop will work with other crop models in DSSAT v3.



SCREEN 2.

To select a crop for conversion: Use the arrow keys to move the highlight bar over the crop(s) you wish to select. Press the <ENTER> key. Once selected, a "check" mark will appear to the left of the selected item. This "check" mark behaves like a toggle switch and can be turned on and off by repeatedly pressing the <ENTER> key while the item is highlighted.

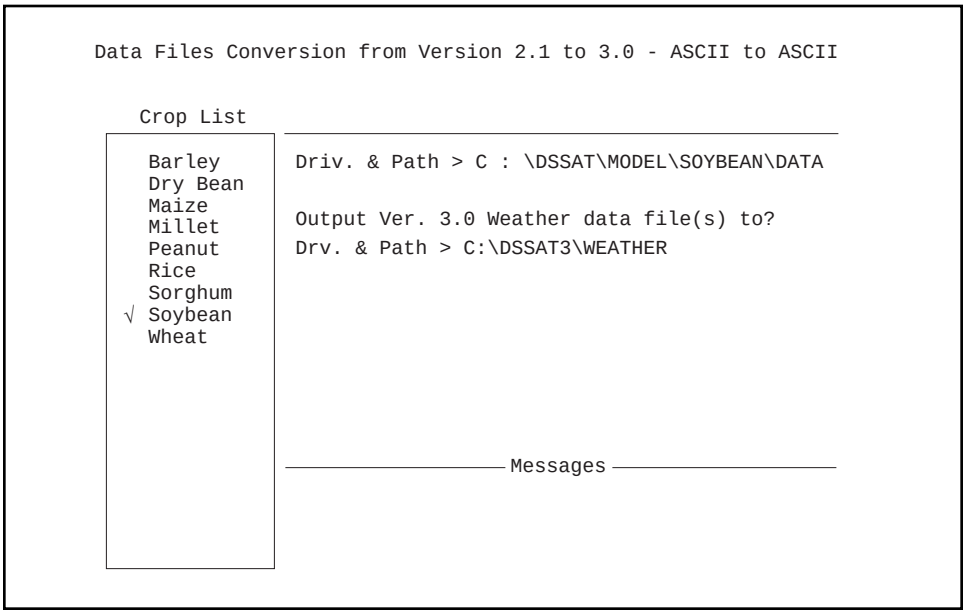
To obtain help: Press the <F1> key.

To select all crops: Press <F4> to "check" mark all of them.

To change a crop's drive and path: Press <F2> and enter the correct drive and path.

To continue with conversion: Press <F10> once you have completed selecting crops.

To return to Screen 1: Press the <ESC> key.
When you have made a selection for conversion,the dialog box shown in Screen 3

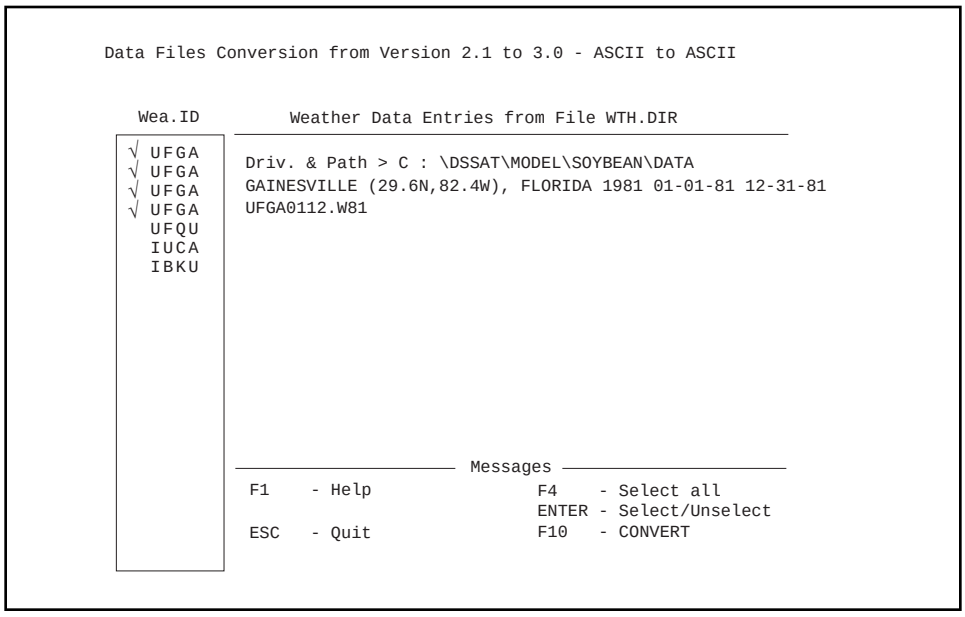


SCREEN 3.

(above) will appear. You must enter in this screen the drive and path where you want the new DSSAT v3 format file to be stored.

For example, these files could be stored in C:\DSSAT3\Weather.

Once a path is entered, a screen similar to Screen 4 (on the following page) will be presented. In this screen are listed all weather data sets in the path or paths selected that may be converted from DSSAT v2.1 to v3 format.



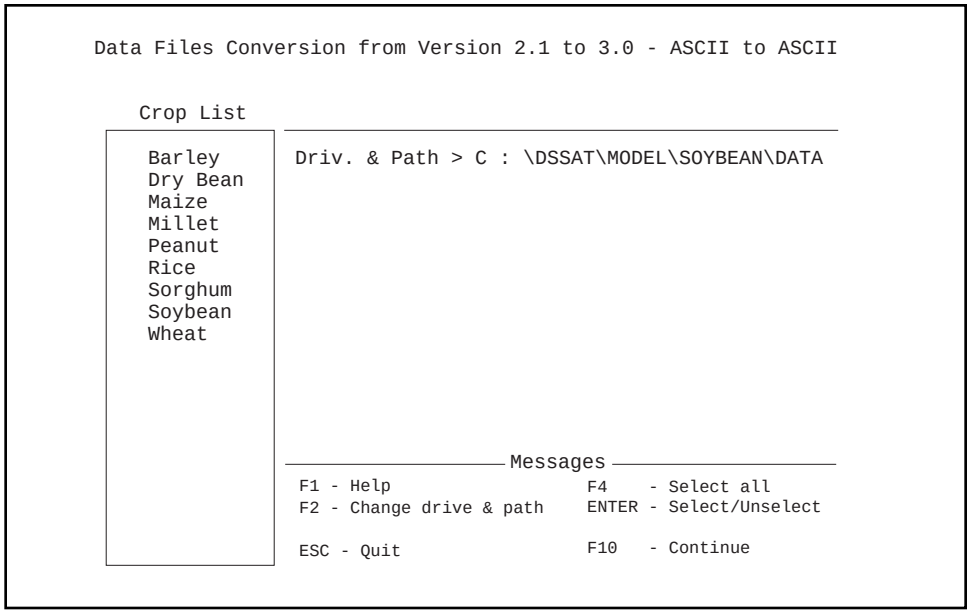
SCREEN 4.

To select a weather data set for conversion: Use the arrow keys to move the highlighted bar over the weather data set(s) you wish to select. Press the <ENTER> key. Once selected, a "check" mark will appear to the left of the selected item. This "check" mark behaves like a toggle switch and can be turned on and off by repeatedly pressing the <ENTER> key while the item is highlighted.

The operations of the <F1>, <F4>, <F10> and <ESC> keys are the same as described under Screen 2 in this Chapter.

CHAPTER THREE.
EXPERIMENT AND SOIL DATA CONVERSION

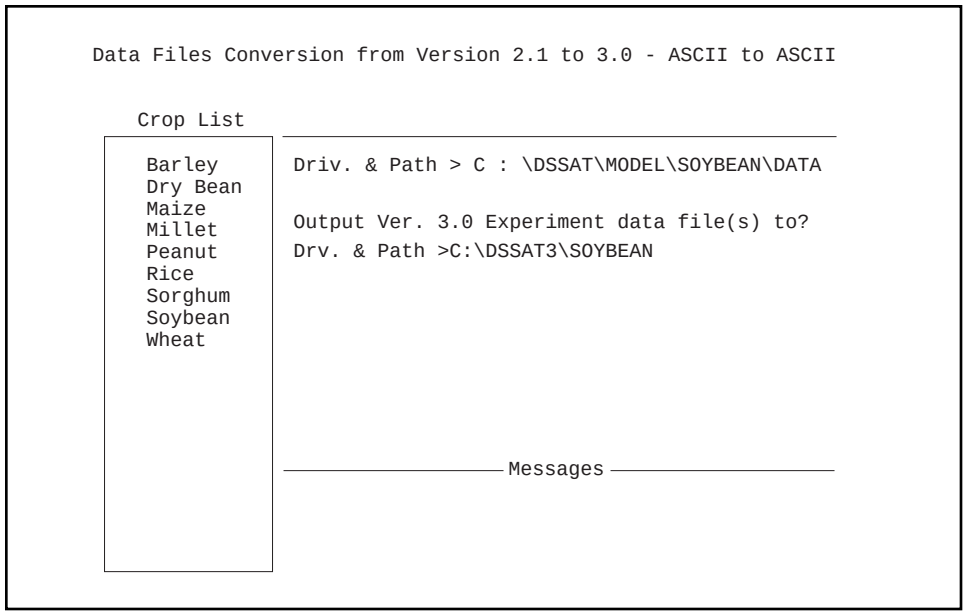
The "Experiment & Soil Data" menu option allow you to convert DSSAT v2.1 experiment data sets to DSSAT v3 data sets. When this option is selected, Screen 5 (below) will be presented. As is the case with the “Weather Data” menu option, a crop list is displayed because experiment data were usually stored in each crop's data directory. Move through the list using the arrow keys. When a crop is highlighted,, the default drive and path of that crop are shown in the right hand window. Selecting a crop, also selects the drive and path displayed; the user, however, may change these. The Convert program will convert crop model input FILEs 4,5,6,7,8,A,B,C and D, as well as the companion soil profile data used by the selected experiments.



SCREEN 5.

To select a crop for conversion: Use the arrow keys to move the highlight bar over the crop(s) you wish to select. Press the <ENTER> key. Once selected, a "check" mark will appear to the left of the selected item. This "check" mark will appear to the left of the selected item. This "check" mark behaves like a toggle switch and can be turned on and off by repeatedly pressing the <ENTER> key while the item is highlighted.

The operations of the <F1>, <F4>, <F10> and <ESC> keys are the same as described under Screen 2 in this Chapter.

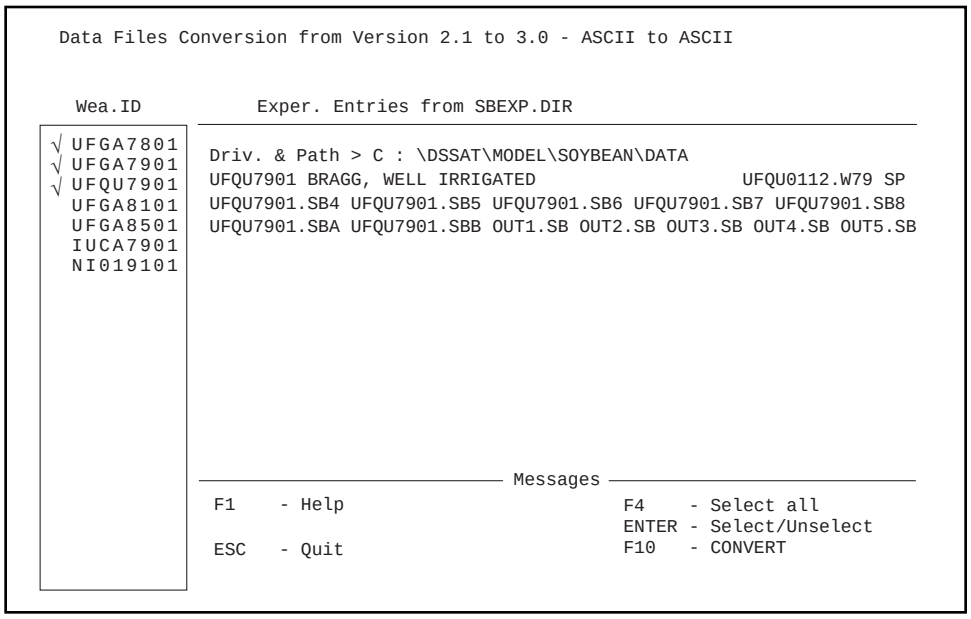


SCREEN 6.

When you have made a selection for conversion,the dialog box shown in Screen 6 (above) will appear. You must enter in this screen the drive and path where you want the new DSSAT v3 format file to be stored.

For example, these files could be stored in C:\DSSAT3\Soybean.

Once a path is entered, a screen similar to Screen 7 (on the following page) will be presented. In this screen are listed all the experiments for the selected crop(s) that may be converted from DSSAT v2.1 to v3 format.



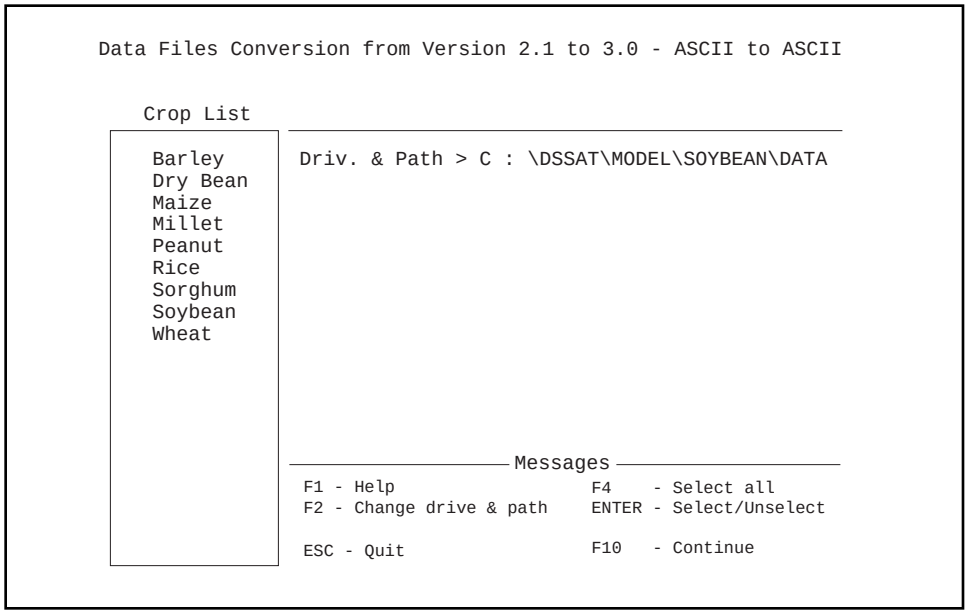
SCREEN 7.

To select an experiment data set for conversion: Use the arrow keys to move the high-light bar over the experiment(s) you wish to select. Press the <ENTER> key. Once selected, a "check" mark will appear to the left of the selected item. This "check" mark behaves like a toggle switch and can be turned on and off by repeatedly pressing the <ENTER> key while the item is highlighted.

The operations of the <F1>, <F4>, <F10> and <ESC> keys are the same as described under Screen 2 in this Chapter.

CHAPTER FOUR.
SOIL DATA CONVERSION

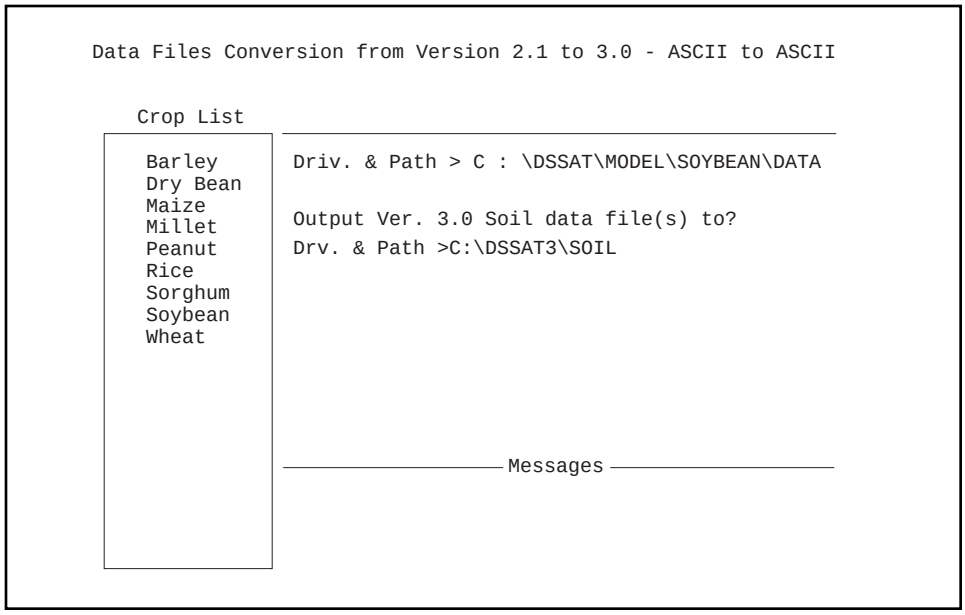
The "Soil Data" menu option allows you to convert soil profiles stored in DSSAT v2.1 SPROFILE format into DSSAT v3 file format. When this option is selected, Screen 8 (below) will be presented. As is the case with the “Weather Data” menu option, a crop list is displayed. Move through the list using the arrow keys. When a crop is highlighted,, the default drive and path of that crop are shown in the right hand window. Selecting a crop, also selects the drive and path displayed; the user, however, may change these. In v2.1, soil profile data files exists for each crop. Thus, you must select all crops for which v2.1 soil files are available to be sure that all of your soil data are converted.



SCREEN 8.

To select a crop for conversion: Use the arrow keys to move the highlight bar over the experiment(s) you wish to select. Press the <ENTER> key. Once selected, a "check" mark will appear to the left of the selected item. This "check" mark behaves like a toggle switch and can be turned on and off by repeatedly pressing the <ENTER> key while the item is highlighted.

The operations of the <F1>, <F4>, <F10> and <ESC> keys are the same as described under Screen 2 in this Chapter.

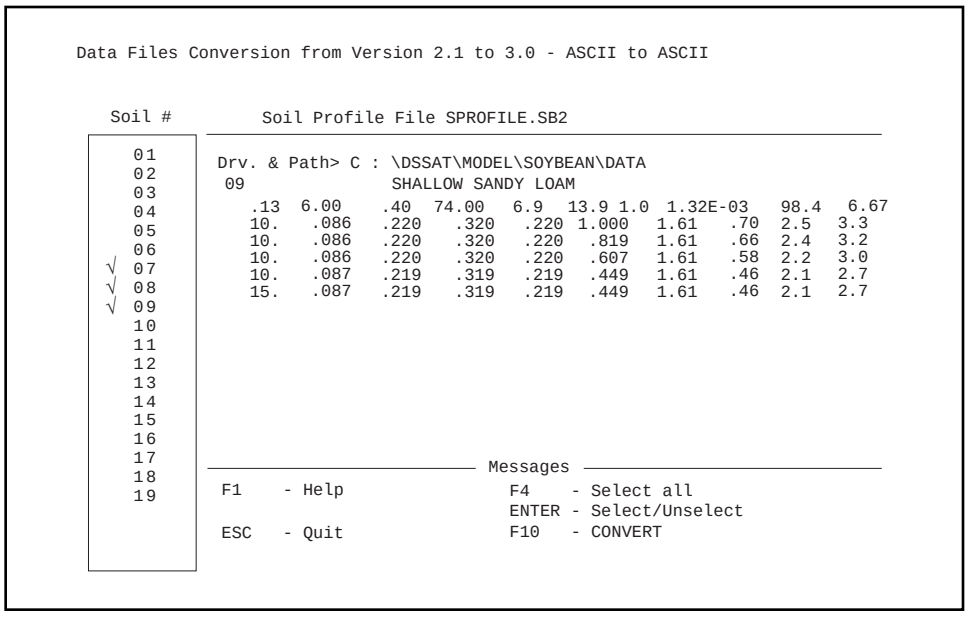


SCREEN 9.

When you have made a selection for conversion,the dialog box shown in Screen 9 (above) will appear. You must enter in this screen the drive and path where you want the new DSSAT v3 format file to be stored.

For example, these files could be stored in C:\DSSAT3\Soil.

Once a path is entered, a screen similar to Screen 10 (on the following page) will be presented. In this screen are listed all the soil profiles that may be converted from DSSAT v2.1 to v3 format.



SCREEN 10.

To select a soil profile for conversion: Use the arrow keys to move the highlight bar over the experiment(s) you wish to select. Press the <ENTER> key. Once selected, a "check" mark will appear to the left of the selected item. This "check" mark behaves like a toggle switch and can be turned on and off by repeatedly pressing the <ENTER> key while the item is highlighted.

The operations of the <F1>, <F4>, <F10> and <ESC> keys are the same as described under Screen 2 in this Chapter.

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APPENDIX.
DSSATPRO.FLE FILE

```
*** * DSSATPRO FILE * ***
DDB  C:  \DSSAT3 BDM.EXE
DTB  C:  \DSSAT3 CODEMENU.EXE
DTE  C:  \DSSAT3 EFM.EXE
DTO  C:  \DSSAT3 GFM.EXE
DTX  C:  \DSSAT3 EMENU.EXE
DPT  C:  \DSSAT3 GETSOIL.BAT
DIM  C:  \DSSAT3 CONVERT.EXE
DTP  C:  \DSSAT3 GFM.EXE
DPF  C:  \DSSAT3 FLFM.EXE
DFO  C:  \DSSAT3 GCFA.EXE
DIS  C:  \DSSAT3 WINGRAF.BAT
DDW  C:  \DSSAT3 WFM.EXE
DWG  C:  \DSSAT3 WMGRAF.BAT
DWC  C:  \DSSAT3 WM.EXE
DDS  C:  \DSSAT3 SFM.EXE
DTS  C:  \DSSAT3 GUMGRAF.BAT
DDG  C:  \DSSAT3 GFM.EXE
DCG  C:  \DSSAT3 GENCALC.EXE
DPM  C:  \DSSAT3 GFM.EXE
DDE  C:  \DSSAT3 GFM.EXE
MBA  C:  \DSSAT3 0 0 0 I
MMZ  C:  \DSSAT3 MDRIV940.EXE MINPT940.EXE GECER940.EXE I
MML  C:  \DSSAT3 O O O I
MRI  C:  \DSSAT3 MDRIV940.EXE MINPT940.EXE RICER940.EXE I
MSG  C:  \DSSAT3 O O O I
MWH  C:  \DSSAT3 MDRIV940.EXE MINPT940.EXE GECER940.EXE I
MBN  C:  \DSSAT3 MDRIV940.EXE MINPT940.EXE CRGRO940.EXE I
MSB  C:  \DSSAT3 MDRIV940 EXE. MINPT940.EXE CRGRO940.EXE I
MPN  C:  \DSSAT3 MDRIV940.EXE MINPT940.EXE CRGRO940.EXE I
MAR  C:  \DSSAT3 0 0 0 I
MCS  C:  \DSSAT3 MDRIV940.EXE MINPT940.EXE CSCAS940.EXE I
MPT  C:  \DSSAT3 0 0 0 I
MOT  C:  \ 0 0 0
MFA  C:  \DSSAT3 MDRIV940.EXE MINPT940.EXE  LEGRO940.EXE I
MIO  C:  \DSSAT3 EFM.EXE 0 0
MLO  C:  \DSSAT3 GFM.EXE 0 0
MGR  C:  \DSSAT3 WINGRAF.EXE
```

```
AQS  C:  \DSSAT3 SEQDRV.EXE
AQA  C:  \DSSAT3 SUSTAIN2.EXE
TOE  C:  \DSSAT3 TED.COM
TOS  C:  \
TOM  C:  \
BGD  C:  \DSSAT3\BACKGRND
CDD  C:  \DSSAT3
WED  C:  \DSSAT3\WEATHER
WGD  C:  \DSSAT3\WEATHER\GEN
CLD  C:  \DSSAT3WEATHER\CLIMATE
SLD  C:  \DSSAT3\SOIL
CRD  C:  \DSSAT3\GENOTYPE
EXD  C:  \DSSAT3\EXPER
FID  C:  \DSSAT3\BACKGRND
BAD  C:  \DSSAT3
MZD  C:  \DSSAT3\MAIZE
MLD  C:  \DSSAT3
RID  C:  \DSSAT3\RICE
SGD  C:  \DSSAT3
WHD  C:  \DSSAT3\WHEAT
BND  C:  \DSSAT3\DRYBEAN
SBD  C:  \DSSAT3\SOYBEAN
PND  C:  \DSSAT3\PEANUT
ARD  C:  \DSSAT3
CSD  C: \DSSAT3\CASSAVA
PTD  C:  \DSSAT3
OTD  C:  \
ASD  C:  \DSSAT3\SEASONAL
AQD  C:  \DSSAT3\SEQUENCE
PSD  C:  \DSSAT3\PEST
ECD  C:  \DSSAT3\ECONOMIC
TOD  C:  \
```