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CHNICAL REPORT 5

Documentation for IBSNAT Crop Model Input & Output Files, Version 1.1

for the Decision Support System for Agrotechnology Transfer (DSSAT V.2.1)

International Benchmark Sites Network for Agrotechnology Transfer

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IBSNAT PROJECT

IBSNAT, the International Benchmark Sites Network for Agrotechnology Transfer, is a group consisting of the contractor (University of Hawaii) and several collaborators. Together they have created a prototype network of national, regional, and international agricultural research centers for the purpose of developing, validating, and using a scientific method for the effective transfer of agrotechnology among and within countires in the tropics and subtropics.

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PREFACE

This report's conception and development arose from the recognition by several IBSNAT collaborators of the need to standardize and document crop model input and output file structures and data formats for those scientists who are developing crop models or model applications for IBSNAT. It was through their efforts that this document was written.

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CHAPTER 1

RATIONALE & PURPOSE

A major goal of the International Benchmark Sites for Agrotechnology Transfer (IBSNAT) Project is to develop improved capabilites for transferring agricultural production technology from sites of origin to new locations. To reach this goal, IBSNAT is developing a systems approach which uses crop simulation models adapted to evaluate the potential of various soil and crop management alternatives.

In order for this approach to be successful, crop models must first be validated by comparing model predictions with observations from field experiments. Crop model validation requires: (1) an experiment at a site, (2) data describing the soil profile and initial conditions at the site, (3) management practices and weather data collected during the experiment, and (4) measurements of actual crop development, growth, and yield for each treatment in the experiment. In some cases, the experiment could be a farmer's field and thus consist of only one treatment. Usually, however, a collection of experiments is needed for validation under different weather and management conditions. After the experiment is conducted, the soil, weather, and management data are entered into computer files, the files are converted to a format required by crop model inputs, and the same experiment is simulated. Crop model predictions can then be compared with actual experimental observations, and any differences between observed and simulated results can be analyzed.

The IBSNAT Project has accepted responsibility for developing several major food crop models. Four models (maize, wheat, soybean, and peanut) have been adapted to IBSNAT standards and are available for validation by collaborators at their sites. Additional models for rice, dry bean, potatoes, barley, millet, sorghum, cassava, and aroid are in various stages of development and most are available for testing. All of these crop models require similar inputs of soil, weather, and management data, and all predict similar outputs of soil responses, crop growth, and yield data.

In the past, little effort has been made to standardize inputs and outputs for crop models, and thus each has evolved with unique data structures. Since collaborators may use crop models to compare the productivity of severals crops at various sites, input data structures must be standardized. Standardized inputs will enable all current IBSNAT crop models to use the same site data to simulate growth and yield responses of each crop for a particular site, and will enable crop modelers to develop application programs for their models which have the ability to access the same data. In addition, standardized model outputs will help collaborators interpret results from different models and will make analysis or graphical presentation easier. Then, routine analysis procedures could be systematically applied to all the crop models in technology transfer studies.

IBSNAT is developing an integrated computer system that provides collaborators with access to crop models for validation under local conditions. This facilitates the use of crop models to evaluate the suitability of crop production technology at specific sites. This integrated system is the IBSNAT Decision Support System for Agrotechnology Transfer (DSSAT). The DSSAT system consists of several components: (1) crop models; (2) soil and weather data; (3) collaborators' experimental data; and (4) application programs to enter and retrieve data, link the models with site and experimental data files, and analyze the observed and simulated data for specific objectives. The minimum data set (MDS) described in

IBSNAT Technical Report 1, 3rd ed., contains standardized site and experimental data formats for use by collaborators around the world. A data base management system (DBMS) stores these data and provides easy-to-use procedures for entering site and experimental data and retrieving data for subsequent analyses and crop model simulation.

Standardized input and ouput data formats for different crop models give collaborators the ability to use any of the crop models after fundamental site data are obtained. The purpose of this report is to document these input and output files and formats. Scientists who are developing models or model applications for IBSNAT must adopt these file structures and data formats.

CHAPTER 2

OVERVIEW OF FILE STRUCTURES

The standard input and output files were developed after careful study of the three existing models being adapted for IBSNAT use: CERES-Maize (Jones and Kiniry 1986), CERES-Wheat, and SOYGRO V5.0 (Wilkerson et al. 1985). Each of these models uses daily weather data, the same soil water balance model (Ritchie 1985), and similarly detailed descriptions of crop phenological development, growth, and yield (Jones and Kiniry 1986; Wilkerson et al. 1985). However, inputs and outputs were initially different and changes were required in each model as it was adapted for use in the DSSAT. The modified crop model versions are: CERES-Maize V2.1, CERES-Wheat V2.1, SOYGRO V5.42, and PNUTGRO V1.02.

The input and output files for crop models in the DSSAT are organized into four types. The files are arranged so that all treatments of an experiment can be simulated for direct comparison with field data collected and entered into the MDS, and so that sensitivity analysis can be performed on various management options. User-friendly interfaces for the crop models allow users to select an experiment and then select any or all treatments from the experiment for simulation. Thus, experiments reported in the MDS can easily be simulated for comparison with observed data. Users may also elect to modify treatment conditions to evaluate "what-if" questions. For example, different weather, soil, cultivar, planting date, irrigation management, row spacing, and nitrogen fertilizer management can be changed interactively. Simulated results can then be plotted from any of the runs for comparison with real experimental treatments or for evaluation of hypothetical treatments.

The first type of file has information which identifies experimental data (EXP.DIR) and weather data (WTH.DIR). A second group of files provides input data for crop genetic coefficients, weather, soil, and management information for all of the treatments of an experiment (FILF1, FILE2,..., FILE0). The third type of file contains field-measured data extracted from the MDS for comparison with simulated results for all experimental treatments (FILEA, FILEB). The fourth file type contains output results for all experimental and hypothetical treatments that were simulated during one session (OUT1, OUT2, OUT3, OUT4, OUT5). Outputs include summary results as well as seasonal values for crop, soil water, and soil nitrogen variables.

Various types of input and output files used by crop models in DSSAT and the file variable names are shown in Table 1. To readily identify files, a descriptive file naming convention has been adopted. This enables the file type, crop, institute, site, and year of planting to be quickly ascertained. The convention is based upon a series of two character identifiers as depicted in Table 2 for an example file, UFGA8101.SB8. The EXP.DIR file is a directory file used to specify these file names for a given experiment. When individual models are integrated into DSSAT, the descriptive naming convention should be used.

To help simplify the integration of new models into DSSAT, models should have an input and an output module containing subroutines that read and write the various input and output files. A schematic of DSSAT (Figure 1) shows the linkages between the data bases for weather, soil, and site experiments (MDS), the input files required for execution of crop models, and the standard crop model output files for subsequent graphical display and analysis.

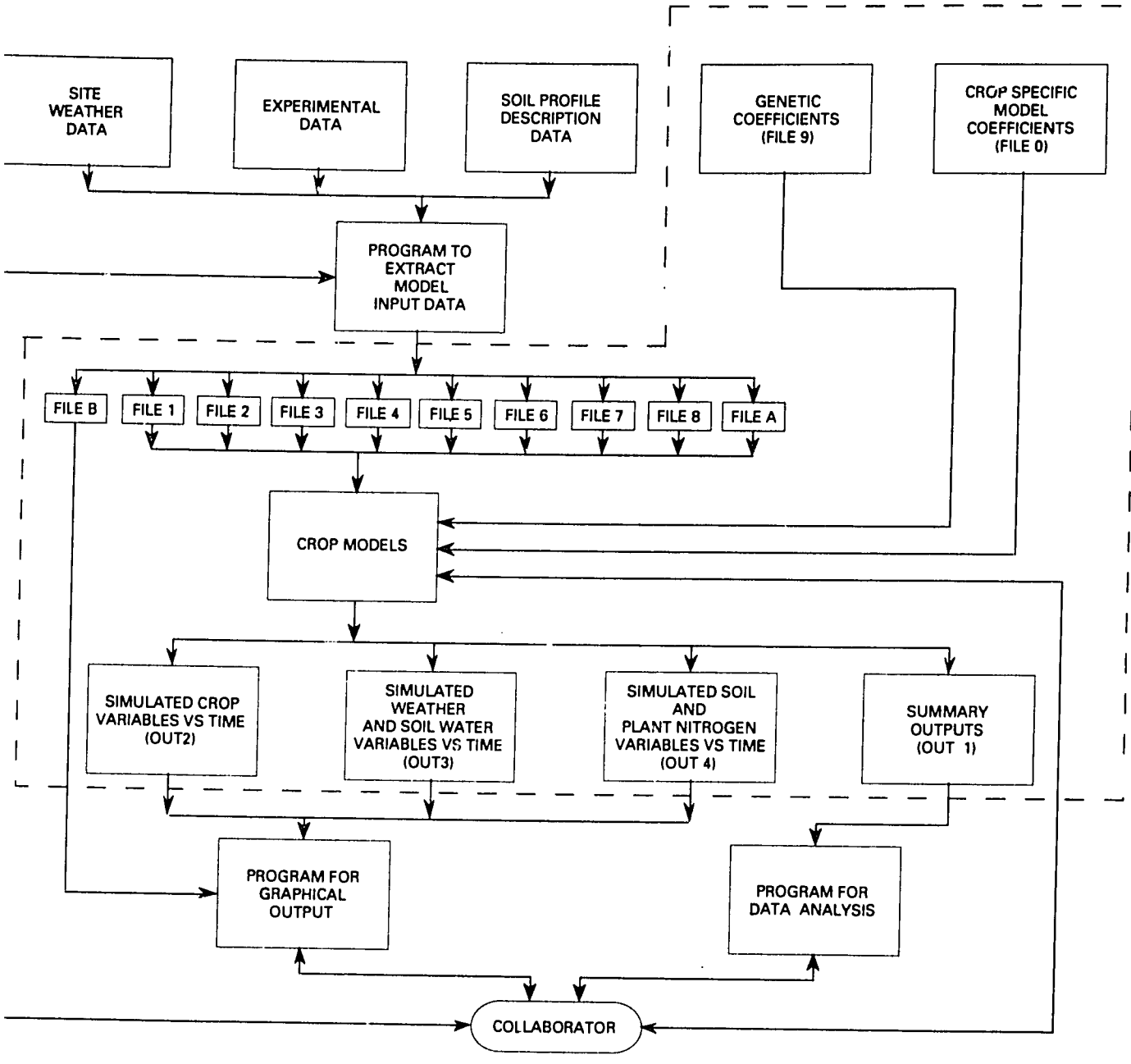

Figure 1. *Schematic of the linkage between crop models and the collaborator experiment, weather, and soil data; and the programs for providing graphical outputs and data analysis results to collaborators. The dashed line encompasses the standard data files and crop models. Crop modelers must adhere to formats defined in this documentation to ensure that their models can link into IBSNAT's DSSAT.*

INPUT FILES

Files FILE4 through FILE8 contain input data for all treatments of an experiment. In contrast FILE2 contains data for all soil types and FILE9 contains cultivar-specific genetic coefficients for cultivars of the crop. Since FILE2 contains soil profile data for many soils, a standard name of SPROFILE.XX2 is used to identify soil profile data sets, where "XX" is the crop code designation. Thus, SPROFILE.SB2 identifies a soybean soil profile data set and SPROFILE.WH2, a wheat data set, etc. Similarly, GENETICS.SB9 is FILE9 for soybean and contains cultivar-specific coefficients for soybean cultivars. For each treatment of an experiment, the soil and cultivar are specified in the treatment management file (FILE8).

Because weather data files can be used by any of the models, a slightly different naming convention for FILE1 is used which enables identification of the beginning of the weather rec

Table 1.
Description of standard input and output files for the IBSNAT crop models.

File Variable Names	Description
Directory files	
EXP.DIR	Directory of files for each experiment.
WTH.DIR	Directory of available weather data.
Input files	
FILE1	Daily weather data.
FILE2	Soil profile properties.
FILE3	Unused at present time.
FILE4	Soil nitrogen dynamics properties.
FILE5	Soil profile initial conditions.
FILE6	Irrigation management data.
FILE7	Nitrogen fertilizer management data.
FILE8	Crop management data.
FILE9 (by crop)	Genetic coefficients.
FILE0 (by crop)	Crop-specific coefficients.
Validation files with field measured data	
FILEA (by crop)	Measured summary data.
FILEB (by crop)	Measured seasonal data for graphics.
Output files	
OUT1 (by crop)	Output record of crop model inputs. Simulated biomass and water balance components at selected phenological stages. Harvest summary (simulated and observed).
OUT2 (by crop)	Simulated crop variables *vs.* time.
OUT3 (by crop)	Weather variables and simulated soil water balance *vs* time.
OUT4 (by crop)	Simulated soil nitrogen variables vs. time.
OUT5 (by crop)	Selected harvest components and development durations for management strategy analysis.

Table 2.
Description of codes used in input file-naming convention.

Below is an example for the file named UFGA8101.SB8.

Character	Reference	Example	Description
1-2	Institute ID	UF†	University of Florida
3-4	Site ID	GA	Gainesville
5-6	Year experiment planted	81	1981
7-8	Experiment no.	01	Experiment 1
9	Must be "."		
10-11	Crop code	SB††	Soybean
12	File number	8	Description Management Data

†Users should refer to the *IBSNAT Technical Report 1*, 3rd ed. for their institute codes.
††The following crop codes are used for IBSNAT crops:

WH = Wheat	MZ = Maize	SG = Sorghum	ML = Millet
RI = Rice	PT = Potatos	CS = Cassava	AR = Aroid
SB = Soybean	PN = Peanut	BN = Dry Bean	BA = Barley

ord (an example of a weather file name can be found under "Description" in the section entitle "WTH.DIR": Weather File Directory"). One weather file can be used by several experiments as well as by all treatments in a particular experiment. If an experiment has multiple locations with different weather stations at each location, the EXP.DIR file must contain a 3-line entry for each location.

Data for all input files can be retrieved from the MDS in DSSAT, but these data can also be created manually during model development. In some instances, input data for a specific variable may not be available. For all input files, a "-9" will be placed in that variable field to indicate the missing value.

OUTPUT FILES

Five standard output files are associated with an experiment. There may be slight differences in output files OUT1, OUT2, OUT3, and OUT4 among crop models. However, these differences are minimal and are primarily because of differences in the measurement variables. Examples presented later in this report will show the explicit differences that exist between each of these files among crop models. The fifth output file, OUT5, used for Strategy Evaluation, is the same for all crop models. All current and new IBSNAT models should conform as closely as possible to these output formats and file names.

The output files are designed so all simulation results from a session are concatenated in the respective file types. When users wish to save simulated results, they must change the names of these output files to permanent files. Each time a new session is started, OUT1-OUT5 are re-initialized and any previous results will be lost. Additional outputs, other than the ones described in Table 1, could be included as separate files when a model is being developed, or even applied to studies requiring special outputs.

CHAPTER 3

DISCUSSION

The development of standards, although necessary, is not without drawbacks. To a large extent, the definition of standard model inputs and outputs imposes certain restrictions on model structures and thus on the capability of a model to predict responses to certain factors. This effect is not the intent of the standards presented in this document. Indeed, it is anticipated that future models or changes in existing models will require additional inputs that are not now included in the defined files.

This section discusses a few potential directions model developments may take. For example, there are no files that specify phosphorus fertilizer management because the existing models do not respond to phosphorus. Work currently in progress on a phosphorus model will eventually become part of the crop models. At that time, FILE7, the fertilizer management file which currently only contains nitrogen fertilizer data, would need changing. Dates and amounts of phosphorus fertilizer could be appended to FILE7 without affecting the standard data for nitrogen fertilizer in the same file, or in any of the other files. Since other changes may occur in future models, all revised versions of the input and output data files will be made and distributed periodically by IBSNAT. It is important, therefore, that collaborators who are developing new components for models should add new inputs to the files so that existing data are unchanged.

When adding new input requirements to the models, it is important that model developers document the sources of the input values. In particular, IBSNAT model developers should be aware that the existing soil profile data and the minimum data set (MDS) impose limitations on the estimation of inputs. Whenever possible, therefore, inputs should be derived or estimated from these basic data sources to allow model application for all sites where such data are available. If this is not possible, IBSNAT should be informed so that consideration can be given to changing the MDS or soil profile data requirements. However, suggestions for changes in the basic site data are not encouraged because of the difficulty and time required in effecting such changes. In addition, model developers should supply procedures for estimating model inputs from these basic data sources.

Model input data that are neither site-specific nor time-dependent should be included in a crop-specific data file as indicated in Figure 1. At this time, IBSNAT does not intend to standardize such files. They will be supplied to users along with the models. However, model developers should carefully document such files so that users can modify the data for local calibration, if necessary. Model developers should also supply and document the cultivar-specific genetic coefficient data file for each crop model. The source of the coefficients and methods for estimating coefficients for additional varieties should be detailed.

In addition to the five standard output files, modelers and users may wish to add additional outputs. An additional file (or files) should be used so that files OUT1 through OUT5 remain fixed and can link directly into standard application programs. Future changes may also be needed in standard outputs for various applications, and suggestions are highly encouraged.

IBSNAT can not anticipate when a future revision will be issued, but when it occurs, IBSNAT will send revisions to those who have received the original versions. Suggestions

from users for improvements are highly encouraged and will be carefully considered in future revisions.

Brief descriptions of each of the input and output files, their variable descriptions, and examples of each input and output file are presented in the next sections.

CHAPTER 4

DIRECTORY FILE STRUCTURES

EXP.DIR: experiment file directory

DESCRIPTION

The experiment file directory was developed to allow great flexibility in retrieving data needed to simulate various experiments from different locations and different years. This fil contains the names of all input and output data files associated with a particular experiment for a crop. For each experiment in the file, three lines of information are required, and there must be a blank space before each field, except before the first field on each line, to ensure readability of this file. On the first line, the experiment identifier (8 characters) specifies the institute code, site code, year of experiment, and experiment number. After skipping one space, the next 40 characters briefly describe the experiment. The next two 12-character field on line one identify the weather file name associated with this experiment (FILE1) and the name of the soil profile file (FILE2). On the second line of the experiment directory file, there are six 12-character fields which identify the names of files FILE4 through FILE9 for this experiment. On the third line, two 12-character fields identify the names of the validation files FILEA and FILEB, and five 7-character fields identify output files OUT1 through OUT5. If more than one experiment is to be simulated, three lines, equivalent in content to the first three described above, are appended to the EXP.DIR file for each experiment.

Two examples (for soybean and maize) are shown on the following page. The format for wheat is the same as the format for maize, and the format for peanut is the same as the format for soybean. An EXP.DIR is needed for each crop model in the DSSAT, and the crop code identifier is appended to the front of this file name for each crop. For example, the soybean experiment directory is named SBEXP.DIR, whereas the maize experiment directory is named MZEXP.DIR.

DATA FORMATS

Variable Name	FORTRAN format	Description
Format for line 1		
EXPID	A8	Experiment identifier.
EXPDES	1X,A40	Experiment description.
FILE1	1X,A12	Daily weather data file name.
FILE2	1X,A12	Soil profile file name.
Format for line 2		
FILE4	A12	Soil nitrogen dynamics properties file name.
FILE5	1X,A12	Soil profile initial conditions file name.
FILE6	1X,A12	Irrigation management data file name.
FILE7	1X,A12	Nitrogen fertilizer management data file name.
FILE8	1X,A12	Crop management data file name.
FILE9	1X,A12	Genetic coefficients file name.
Format for line 3		
FILEA	A12	Measured summary data file name.
FILEB	1X,A12	Measured seasonal data file name.

OUT1	1X,A7	File name for output file 1.
OUT2	1X,A7	File name for output file 2.
OUT3	1X,A7	File name for output file 3.
OUT4	1X,A7	File name for output file 4.
OUT5	1X,A7	File name for output file 5.

EXAMPLE OF SBEXP.DIR

```
1- column numbers
1--------------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777777
1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678
--------------------------------------------------------------------------------
UFGA7801 BRAGG, IRRIGATED & NON-IRRIGATED        UFGA0112.W78 SPROFILE.SB2
UFGA7801.SB4 UFGA7801.SB5 UFGA7801.SB6 UFGA7801.SB7 UFGA7801.SB8 GENETICS.SB9
UFGA7801.SBA UFGA7801.SBB OUT1.SB OUT2.SB OUT3.SB OUT4.SB OUT5.SB
UFGA7901 BRAGG, IRRIGATED & NON-IRRIGATED        UFGA0112.W79 SPROFILE.SB2
UFGA7901.SB4 UFGA7901.SB5 UFGA7901.SB6 UFGA7901.SB7 UFGA7901.SB8 GENETICS.SB9
UFGA7901.SBA UFGA7901.SBB OUT1.SB OUT2.SB OUT3.SB OUT4.SB OUT5.SB
UFQU7901 BRAGG, WELL IRRIGATED                   UFQU0112.W79 SPROFILE.SB2
UFQU7901.SB4 UFQU7901.SB5 UFQU7901.SB6 UFQU7901.SB7 UFQU7901.SB8 GENETICS.SB9
UFQU7901.SBA UFQU7901.SBB OUT1.SB OUT2.SB OUT3.SB OUT4.SB OUT5.SB
UFGA8101 COBB, IRRIGATED, VEG. & REPROD. STRESS  UFGA0112.W81 SPROFILE.SB2
UFGA8101.SB4 UFGA8101.SB5 UFGA8101.SB6 UFGA8101.SB7 UFGA8101.SB8 GENETICS.SB9
UFGA8101.SBA UFGA8101.SBB OUT1.SB OUT2.SB OUT3.SB OUT4.SB OUT5.SB
UFGA8501 COBB, IRRIGATED & NON-IRRIGATED         UFGA0112.W85 SPROFILE.SB2
UFGA8501.SB4 UFGA8501.SB5 UFGA8501.SB6 UFGA8501.SB7 UFGA8501.SB8 GENETICS.SB9
UFGA8501.SBA UFGA8501.SBB OUT1.SB OUT2.SB OUT3.SB OUT4.SB OUT5.SB
↓
↓
↓
etc.(arrows indicate this example is a partial file).
```

EXAMPLE OF MZEXP.DIR

```
1- column numbers
1--------------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777777
1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678
--------------------------------------------------------------------------------
IBWA8301 N X VAR WAPIO, IBSNAT EXP.1983-4        IBWA1010.W83 SPROFILE.MZ2
IBWA8301.MZ4 IBWA8301.MZ5 IBWA8301.MZ6 IBWA8301.MZ7 IBWA8301.MZ8 GENETICS.MZ9
IBWA8301.MZA IBWA8301.MZB OUT1.MZ OUT2.MZ OUT3.MZ OUT4.MZ
UFGA8201 N X IRRIGATION, GAINESVILLE             UFGA0112.W82 SPROFILE.MZ2
UFGA8201.MZ4 UFGA8201.MZ5 UFGA8201.MZ6 UFGA8201.MZ7 UFGA8201.MZ8 GENETICS.MZ9
UFGA8201.MZA UFGA8201.MZB OUT1.MZ OUT2.MZ OUT3.MZ OUT4.MZ
FLSC8101 N X IRRIG., S.C. (CERES MAIZE BK)       FLSC0109.W81 SPROFILE.MZ2
FLSC8101.MZ4 FLSC8101.MZ5 FLSC8101.MZ6 FLSC8101.MZ7 FLSC8101.MZ8 GENETICS.MZ9
FLSC8101.MZA FLSC8101.MZB OUT1.MZ OUT2.MZ OUT3.MZ OUT4.MZ
↓
↓
↓
etc.
```

WTH.DIR: weather file directory

DESCRIPTION

The weather file directory has a listing of all weather data file names, along with information on location, and beginning and ending month of weather data in the file. Weather file names include institute and site code identifiers, beginning month of weather, number of months of weather records, and the year in which the data starts. For example, UFGA0112.W78 is the name of the weather data file for University of Florida (UF), at the Gainesville site (GA), beginning with January data (01), and containing 12 months of data (12) for 1978 (78). Weather data in a file can start in one year and end in a second year. For example, IBWA1106.W83 has data starting in November, 1983, and continuing for 6 months through April, 1984. This WTH.DIR file should contain the file names of all weather data that a user would need to simulate actual or hypothetical experiments. An example of this file is given below with reference to eight weather data sets. In DSSAT, this file is independent of crop type.

DATA FORMATS

Variable Name	FORTRAN Format	Description
WTHID	A4	Weather station ID.
WTHDES	1X,A40	Weather station description.
BEGDATE	A8	Beginning date in weather file.
ENDDATE	1X,A8	Ending date in weather file.
FILE1	1X,A12	Weather file name.

EXAMPLE OF WTH.DIR (for soybean).

```
"IUCA0109.W79"
1- column numbers
1-----------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
123456789012345678901234567890123456789012345678901234567890123456789012345678
-----------------------------------------------------------------------------
UFGA GAINESVILLE (29.6N,82.4W), FLORIDA 1978 01-01-78 12-31-78 UFGA0112.W78
UFGA GAINESVILLE (29.6N,82.4W), FLORIDA 1979 01-01-79 12-31-79 UFGA0112.W79
UFGA GAINESVILLE (29.6N,82.4W), FLORIDA 1981 01-01-81 12-31-81 UFGA0112.W81
UFGA GAINESVILLE (29.6N,82.4W), FLORIDA 1985 01-01-85 12-31-85 UFGA0112.W85
UFQU QUINCY     (30.6N,86.4W), FLORIDA 1979 01-01-79 12-31-79 UFQU0112.W79
IUCA CASTANA    (42.2N,93.7W), IOWA    1979 01-01-79 09-30-79 IUCA0109.W79
↓
↓
↓
etc.
```

CHAPTER 5

INPUT FILE STRUCTURES

FILE1: daily weather data

DESCRIPTION

Daily weather data must be available in FILE1 for all days of the growing season (minimum requirement), beginning with day of planting and ending at crop maturity. Ideally, the file should contain weather data collected both before planting and after crop maturity. Then, the simulation could start before planting so that soil processes would be simulated. Initial conditions for the soil should coincide with the first day of simulation. Additional weather data also allows users to select alternate planting dates or longer duration crop varieties for model sensitivity analysis. On the first line of this file, the institute and weather station site code identifiers are listed, followed by latitude, longitude, a conversion coefficient (PARFAC) to convert total radiation to photosynthetically active radiation (PAR), and an indicator as to whether PAR is available in the data file (PARDAT). Some crop models such as SOYGRO V5.42 require PAR data and the PARFAC is used when PAR data are not in the weather file (PARDAT=0.00). It should be noted that PAR data are not part of the MDS, so PARFAC will normally be used to estimate PAR from total radiation data. However, when PAR data are included in the weather file, columns 37-42 are reserved for those data, and the indicator PARDAT is set to 1.0. On all subsequent lines in the file, eight variables are recorded, and columns 37-42 are reserved for PAR data when it is available. The variables and format for each line of data for FILE1 are provided on the next page.

DATA FORMATS

Variable Name	FORTRAN Format	Description
Format for line 1 of weather data file		
INSTW	A2	Code for institute ID.
STATW	A2	Code for weather station ID.
XLAT	1X, F6.2	Latitude of station.
XLONG	1X, F6.2	Longitude of station.
PARFAC*	1X, F5.2	Factor to convert MJ/m^2 to E/m^2.
PARDAT	1X, F5.2	Indicator of PAR data (0.00=No).
Format for all other lines of weather data		
INSTW	A2	Code for institute ID.
STATW	A2	Code for weather station ID.
IYR	1X, I2	Year for which weather data is being read.
JUL	1X, I3	Julian date of weather record in data file.
SOLRAD	1X, F5.2	Daily total solar radiation, MJ/m^2.
XTMAX	1X, F5.1	Daily value of maximum air temperature, °C.
XTMIN	1X, F5.1	Daily value of minimum air temperature, °C.
XRAIN	1X, F5.1	Daily total precipitation, mm/day.
XPAR	1X, F6.2	Daily total PAR, if available, E/m^2.

* *In DSSAT V2.1, the PARFAC factor used for the PNUTGRO and SOYGRO models is NOT the conversion from MJ/m^2 to E/m^2. For these models, the PARFAC factor has been hard wired in the DSSAT retrieval program and the required value is 12.07.*

EXAMPLE

This example has weather data from an IBSNAT experiment in Waipio, Hawaii and it does not include PAR data; that is, there are no data in variable field 9 and PARDAT on line 1 is 0.00.

```
"UFGA0112.W78" (only the first twenty days of the file are shown).
1- column numbers
1-----------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555666666666677777777
123456789012345678901234567890123456789012345678901234567890123456789012345678
-----------------------------------------------------------------------------
UFGA 029.63 082.37 11.90  1.00        XLAT, XLONG, PARFAC, PARDAT
UFGA 78   1  5.29  18.3  13.3   4.8  14.60
UFGA 78   2 11.09  18.3   8.3   0.0  21.30
UFGA 78   3 14.68  13.9   3.3   0.0  27.70
UFGA 78   4 14.38  19.4   0.0   0.0  25.90
UFGA 78   5 10.88  23.9   6.7   0.0  19.30
UFGA 78   6 10.78  25.6  11.1   0.0  22.10
UFGA 78   7  9.49  25.0   9.4   0.0  17.60
UFGA 78   8  3.10  23.9  15.6  10.4  11.70
UFGA 78   9 16.28  18.3   1.1  25.1  28.70
UFGA 78  10 15.68   8.9  -3.9   0.0  29.30
UFGA 78  11 15.38  11.7  -2.8   0.0  27.60
UFGA 78  12  7.19  19.4   1.7   0.0  14.70
UFGA 78  13 10.88  20.0  13.3  27.9  21.80
UFGA 78  14 11.38  14.4   3.3   0.0  21.50
UFGA 78  15 14.18   7.8  -3.3   0.0  26.10
UFGA 78  16 13.18  16.1  -3.9   0.0  25.30
UFGA 78  17 10.59  21.7   9.4   4.8  21.10
UFGA 78  18 14.98  21.7   6.7   0.0  29.70
UFGA 78  19  0.60  19.4   8.9  71.9   1.70
UFGA 78  20  4.29  16.7   7.2   6.9   9.20
```

FILE2: soil profile properties

DESCRIPTION

Soil profile properties are used in the soil water, nitrogen, and root growth sections of the crop models. The first line of data in this file contains a soil number, the Soil Conservation Service (SCS) pedon number, and the *Soil Taxonomy* name. If the SCS pedon number is not available, users can use their own description in this field or leave it blank. The second line of data contains soil properties that do not vary with depth, such as surface albedo, SCS curve number, etc. Starting with line 3, one line of data is used for each layer in the profile. After the lines with properties for all layers, a line with a "-1" in the first field is required to indicate the end of data for a soil. The number of layers in this file and the thickness of each layer must be consistent with the initial conditions in FILE5. Default initial conditions for the soil are in FILE2 and will be used if FILE5 is not available. Properties for several soils are input into this file by appending data from each available soil, each with its own sequence number and pedon number. This file may contain properties for several soils with the same soil classification. Model users can use this format and manually input their own values for a soil. DSSAT V2.1 has a soil data base which contans a limited number of international soil profiles. The DSSAT Retrieval program will estimate soil values for FILE2 from SCS pedon data found in the data base or from soil data input by the user.

DATA FORMATS

Variable Name	FORTRAN Format	Description
Format for line 1		
IDUMSL	1X, I2	Number asssigned to a soil type.
PEDON	1X, A12	SCS pedon number.
TAXON	1X, A60	Soil classification.
Format for line 2		
SALB	F6.2	Bare soil albedo, no units.
U	1X, F5.2	Upper limit of stage 1 soil evaporation, mm.
SWCON	1X, F6.2	Soil water drainage constant, fraction drained per day.
CN2	1X, F6.2	SCS curve number used to calculate daily runoff.
TAV	1X, F5.1	Annual average ambient temperature, °C.
AMP	1X, F5.1	Annual amplitude in mean monthly temperature, °C.
DMOD	1X, F3.1	Zero-to-unity factor which reduces the rate constant for mineralization of the humus pool for soils which are poor mineralizers due to chemical or physical protection of the organic matter (default = 1).
SWCON1[a,b]	1X, E9.2	Coefficient in the steady state solution to the radial flow, root uptake equation, cm^3/cm root-day (default = 0.00132).
SWCON2[a,b]	1X, F6.1	Coefficient in the steady-state solution to the radial flow, root uptake equation, cm^3/cm root-day (value calculated by retrieval program)
SWCON3[a,b]	1X, F5.2	Coefficient in the steady-state solution to the radial flow, root uptake equation, cm^3/cm root-day (default = 6.67).
RWUMX[b]	1X,F5.2	Maximum daily root water uptake per unit root length, cm^3/cm root-day (default = 0.04).
PHFAC3[b]	1X,F4.2	Variable to reduce apparent photosynthesis attributed to soil fertility (for grain legume models, default = 1.00).
Format for line 3 through nc		
DLAYR (L)	F6.0	Thickness of soil layer L, cm.
LL (L)	1X, F6.3	Lower limit of plant-extractable soil water for soil layer L, cm^3/cm^3.
DUL (L)	1X, F6.3	Drained upper limit soil water content for soil layer L, cm^3/cm^3.
SAT (L)	1X, F6.3	Saturated water content for soil layer L, cm^3/cm^3.
SW (L)	1X, F6.3	Default soil water content for soil layer L, cm^3/cm^3.
WR (L)	1X, F6.3	Weighting factor for soil depth L to determine new root growth distribution, no units.
BD (L)	1X, F5.2	Moist bulk density of soil in soil layer L, g/cm^3.
OC (L)	1X, F5.2	Organic carbon concentration in soil layer L, %.
NH4 (L)	1X, F5.1	Soil ammonium in soil layer L, mg elemental N/kg soil.

NO3 (L)	1X, F5.1	Soil nitrate in soil layer L, mg elemental N/kg soil.
PH (L)	1X, F5.1	pH of soil in soil layer L in a 1:1 soil: water slurry.
SWCN (L)[d]	1X, F5.1	Saturated hydraulic conductivity in soil layer L, mm/day.

[a] *The equation for radial flow described by Ritchie (1985) follows: Uptake = SWCON1 * EXP (SWCON2 (SW(L) - LL(L))) (SWCON3 - ALOG (RLV(L))). [RLV(L) = root length density for soil layer L (cm root/cm³ soil).]*

[b] *These variables are not required by the CERES-Maize V2.1 and -Wheat V2.1 models. Thus, default or blank values are read but not utilized by these models.*

[c] *Each line, 3-n, is one layer of the soil profile. If n>15, the CERES-Wheat and -Maize models will use the first 15 layers only.*

[d] *This variable is used in the PNUTGRO and SOYGRO models only.*

EXAMPLE

```
"SPROFILE.SB2." (only two soil profiles are shown)
1- column numbers
1-------------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234567
-------------------------------------------------------------------------------
13 Waipio, HI  Waipio (Clayey, kaolinitic, isohyperth, Tropeptic Eutrustox)
0.14  5.00   0.60  60.00  22.0   7.0 1.0  1.32E-03   60.1  6.67  0.04 1.00
5.   0.220  0.350  0.550  0.350  1.000  1.00  2.27   .0   .0  6.3  0.0
10.  0.230  0.350  0.550  0.350  1.000  1.00  2.27   .0   .0  6.3  0.0
15.  0.240  0.350  0.550  0.350  0.800  1.05  1.10   .0   .0  5.8  0.0
20.  0.250  0.370  0.480  0.370  0.400  1.17  1.41   .0   .0  5.8  0.0
20.  0.260  0.380  0.460  0.380  0.200  1.22  0.59   .0   .0  6.0  0.0
20.  0.250  0.380  0.460  0.380  0.050  1.22  0.36   .0   .0  6.0  0.0
20.  0.260  0.400  0.480  0.400  0.020  1.17  0.27   .0   .0  6.0  0.0
-1.  0.000  0.000  0.000  0.000  0.000  0.00  0.00   .0   .0  0.0  0.0
14 Gainesville Millhopper Fine Sand (Loamy,silic,hyperth Arenic Paleudult)
0.18 02.00  00.650  60.00  21.0  29.9 1.0  1.32E-03  114.2  6.67  0.04 0.84
5.    .026   .096   .230   .096  1.000  1.30  2.00   .0   .0   .0   .00
10.   .025   .086   .230   .086  1.000  1.30  1.00   .0   .0   .0   .00
15.   .025   .086   .230   .086  0.498  1.40  1.00   .0   .0   .0   .00
30.   .025   .086   .230   .086   .294  1.40  0.50   .0   .0   .0   .00
30.   .028   .090   .230   .090   .380  1.45  0.10   .0   .0   .0   .00
30.   .028   .090   .230   .090   .133  1.45  0.10   .0   .0   .0   .00
30.   .029   .130   .230   .130   .062  1.45  0.04   .0   .0   .0   .00
30.   .070   .258   .360   .258   .031  1.20  0.24   .0   .0   .0   .00
-1.   .0     .0     .0     .0     .0     .0   0.0    .0   .0   .0   .00
```

FILE3

Unused at the present time.

FILE4: soil nitrogen balance parameters

DESCRIPTION

These are treatment-specific parameters required by all crop models that use the nitrogen dynamics component. For this file, the parameters may also depend on the treatments of the collaborator's experiment. Therefore, one set of these data is needed for each treatment of an experiment and they must be recorded consecutively. For models that do not use the nitrogen components, e.g., nitrogen fixing crops or fully fertilized plots, this file is not needed and can be ignored.

DATA FORMATS

Variable Name	FORTRAN Format	Description
INSTS	A2	Code for institute ID.
SITES	A2	Code for site ID.
YEAR	A2	Year number, last two digits.
EXPTNO	I2	Experiment number.
TRTNO	1X, I2	Treatment number.
STRAW	1X, F5.0	Weight of organic residue of previous crop and/or added green manure, kg/ha.
SDEP	1X, F5.0	Depth of surface residue incorporation, cm.
SCN	1X, F5.0	C:N ratio of surface residue of previous crop, kg C/kg N. (default = 75.0).
ROOT	1X, F5.0	Dry weight of root residue of previous crop, kg/ha. (default = 500).

EXAMPLES

"IBWA 8301.MZ4."

```
1- column numbers
1-------------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456
-------------------------------------------------------------------------------
IBWA8301 01  2000    30    75   200
IBWA8301 02  2000    30    75   200
IBWA8301 03  2000    30    75   200
IBWA8301 04  2000    30    75   200
IBWA8301 05  2000    30    75   200
IBWA8301 06  2000    30    75   200
```

"KSAS8101.WH4."

```
1- column numbers
1-------------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456
-------------------------------------------------------------------------------
KSAS8101  1 6500.   15.   35. 1200.
KSAS8101  2 6500.   15.   35. 1200.
KSAS8101  3 6500.   15.   35. 1200.
KSAS8101  4 6500.   15.   35. 1200.
KSAS8101  5 6500.   15.   35. 1200.
KSAS8101  6 6500.   15.   35. 1200.
```

FILE5: soil profile initial conditions

DESCRIPTION

FILE5 contains initial conditions for soil profile water and nitrogen dynamics submodels. These initial conditions specify the values of water content, ammonium, nitrate, and pH in each vertical layer at the start of the first day of the simulation. Thus, the simulation must be started on the day for which the initial conditions are specified, even if the planting date is later.

Soil profile initial conditions must be specified for a date before planting, or at the latest, on the date of planting which is input in FILE8. The thickness of each layer and the number of layers in this file must correspond exactly with those in FILE2. The first line of data in FILE5 consists of treatment number and an experiment code identifier. Then, there will be one line of data for each soil layer and a "-1" on the line immediately following the data for the last soil layer. This file will have data for each treatment of an experiment at a site, with the treatment being identified on the top line of each consecutive set.

DATA FORMATS

Variable Name	FORTRAN Format	Description
Format for line 1		
TRTNO	I2	Treatment number
INSTS	1X, A2	Code for institute ID.
SITES	A2	Code for site ID.
YEAR	A2	Year number, last two digits.
EXPTNO	I2	Experiment number.
Format for all other lines		
DLAYR (L)	F6.0	Depth of layer L, cm.
SW (L)	1X, F6.3	Soil water content of soil layer L, cm^3/cm^3.
NH4 (L)	1X, F4.1	Soil ammonium in soil layer L, mg elemental N/kg soil.
NO3 (L)	1X, F4.1	Soil nitrate in soil layer L, mg elemental N/kg soil.
PH (L)	1X, F4.1	pH of soil in soil layer L in a 1:1 soil:water slurry.

EXAMPLES

"UFGA7801.SB5." (only two treatments are shown)

```
1- column numbers
1--------------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456
--------------------------------------------------------------------------------
01 UFGA7801
    5.  0.086  0.0  0.0  0.0
   10.  0.086  0.0  0.0  0.0
   15.  0.086  0.0  0.0  0.0
   15.  0.086  0.0  0.0  0.0
   15.  0.086  0.0  0.0  0.0
   30.  0.076  0.0  0.0  0.0
   30.  0.076  0.0  0.0  0.0
   30.  0.130  0.0  0.0  0.0
   30.  0.258  0.0  0.0  0.0
   -1. -1.     0.0  0.0  0.0
02 UFGA7801
    5.  0.086  0.0  0.0  0.0
   10.  0.086  0.0  0.0  0.0
   15.  0.086  0.0  0.0  0.0
   15.  0.086  0.0  0.0  0.0
   15.  0.086  0.0  0.0  0.0
   30.  0.076  0.0  0.0  0.0
   30.  0.076  0.0  0.0  0.0
   30.  0.130  0.0  0.0  0.0
   30.  0.258  0.0  0.0  0.0
   -1. -1.     0.0  0.0  0.0
```

"IBWA8301.MZ5." (only two treatments are shown)

```
1- column numbers
1--------------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456
--------------------------------------------------------------------------------
1 IBWA8301
    5.  0.260  3.4  3.6  5.2
   10.  0.260  2.8  2.8  5.2
   15.  0.300  1.9  1.4  5.0
   20.  0.370  1.1  0.7  4.8
   20.  0.320  0.9  0.5  4.8
   20.  0.290  0.4  0.5  4.5
   20.  0.320  0.1  0.4  4.5
   -1.
2 IBWA8301
    5.  0.260  3.1  5.2  5.2
   10.  0.260  2.5  4.2  5.2
   15.  0.300  1.0  1.2  5.0
   20.  0.370  0.9  0.2  4.8
   20.  0.320  0.6  0.1  4.8
   20.  0.290  0.2  0.1  4.5
   20.  0.320  0.1  0.1  4.5
   -1.
```

FILE6: irrigation management data

DESCRIPTION

For each treatment in an experiment at a site, the Julian dates and depths of irrigation are contained in FILE6. The first line of data for each treatment in the file must contain the treatment number and the experiment code identifier. Then, one line of data is required for each irrigation event. After all irrigation events have been entered for a treatment, a "-1" is entered in each field to signal the end of data for the treatment. Data for the second treatment and subsequent treatments are stacked below that of the first treatment, and data for all treatments are thus contained in this file.

DATA FORMATS

Variable Name	FORTRAN Format	Description
Format for line 1		
TRTNO	I2	Treatment number.
INSTE	1X, A2	Code for institute ID.
SITEE	A2	Code for site ID.
YEAR	A2	Year number, last two digits.
EXPTNO	I2	Experiment number.
Format for all other lines		
JDLAPL (J)	I4	Julian day of year of irrigation event J .
AMT (J)	1X, F4.0	Amount of irrigation added on JDLAPL (J), mm

EXAMPLES

"KSAS8101.WH6." (only three treatments are shown)

```
1- column numbers
1--------------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456
--------------------------------------------------------------------------------
4 KSAS8101
 96  65.
110  78.
117  70.
 -1  -1.
5 KSAS8101
 96  65.
110  78.
117  70.
 -1  -1.
6 KSAS8101
 96  65.
110  78.
117  70.
 -1  -1.
```

```
"UFGA7801.SB6." (only two treatments are shown)
1- column numbers
1--------------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456
--------------------------------------------------------------------------------
01 UFGA7801
 181  13.
 230  13.
 235  13.
 237  13.
 240  11.
 242  11.
 244  11.
 246  11.
 250  11.
 253  11.
 256   8.
 259   8.
 262   8.
 265   8.
 269   7.
 272   8.
 279   7.
 283   8.
 294  10.
  -1  -1.
02 UFGA7801
  -1  -1.
```

FILE7: fertilizer management data

DESCRIPTION

This file is organized similarly to FILE6. For each fertilizer application, one line of data with the four variables listed below must be supplied to FILE7. Since fertilizer applications may vary among treatments, data for each treatment will be stacked on top of each other in this file, each set having the treatment number and experiment code identifier on its top line of data. Following the last entry for each treatment, a "-1" in each field will be used to signal the end of that treatment's data.

DATA FORMATS

Variable Name	FORTRAN Format	Description
Format for line 1 of each treatment		
TRTNO	I2	Treatment number.
INSTE	1X, A2	Code for institute ID.
SITEE	A2	Code for site ID.
YEAR	A2	Year number, last two digits.
EXPTNO	I2	Experiment number.
Format for all fertilizer application events		
JFDAY (J)	I4	Julian day of year of nitrogen fertilizer application J.

AFERT (J)	1X, F5.1	Amount of fertilizer nitrogen added on JFDAY (J), kg N/ha.
DFERT (J)	1X, F5.1	Depth of incorporation of fertilizer application on Julian day (JFDAY), cm.
IFTYPE (J)	1X, I2	Code number for type of fertilizer as specified in, *IBSNAT Technical Report 1*, 3rd ed.

EXAMPLE

"IBWA8301.MZ7"

```
1- column numbers
1--------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234456
--------------------------------------------------------------------------
01 IBWA8301
 333   0.0   0.0  0
  -1  -1.0  -1.0 -1
02 IBWA8301
 333  17.0  15.0  5
   6  17.0   5.0  5
  41  17.0   5.0  5
  -1  -1.0  -1.0 -1
03 IBWA8301
 333  67.0  15.0  5
   6  67.0  05.0  5
  41  67.0  05.0  5
  -1  -1.0  -1.0 -1
04 IBWA8301
 333   0.0   0.0  0
  -1  -1.0  -1.0 -1
05 IBWA8301
 333  17.0  15.0  5
   6  17.0   5.0  5
  41  17.0   5.0  5
  -1  -1.0  -1.0 -1
06 IBWA8301
 333  67.0  15.0  5
   6  67.0   5.0  5
  41  67.0   5.0  5
  -1  -1.0  -1.0 -1
```

FILE8: treatment management data

DESCRIPTION

FILE8 contains crop management data for each treatment averaged over all replications. Two lines of data are required for each treatment of an experiment and must be in consecutive order. On the first line, the experiment code identifier, a brief description of the treatment, the soil number for the treatment, and the cultivar used in the treatment are designated. On the second line, day-to-start simulation, planting date, row spacing, and other management data for the treatment are specified. The first pair of lines in this file are for treatment 1 of the experiment, the second pair are for treatment 2, and so on.

DATA FORMATS

Variable Name	FORTRAN Format	Description
Format for line 1		
INSTE	A2	Code for institute ID.
SITEE	A2	Code for site ID.
YEAR	A2	Year number, last two digits.
EXPTNO	I2	Experiment number.
TRTNO	1X, I2	Treatment number.
TITLET	1X, A40	Title of treatment.
ISOILT	1X, I4	Soil number for this treatment.
IVARTY	1X, I4	Cultivar number for this treatment.
Format for line 2 of each treatment in this file		
ISIM	I4	Julian date simulation begins.
ISOW	1X, I3	Sowing date, Julian day of the year.
PLANTS	1X, F6.2	Plant population, plants/m^2.
ROWSPC	1X, F6.3	Row spacing, m.
SDEPTH	1X, F5.2	Sowing depth, cm.
IIRR	1X, I2	Switch describing irrigation. 1: no irrigation applied (default). 2: irrigation applied using field schedule. 3: automatically irrigated at threshold soil water. 4: assume no water stress, water balance not used.
ISWNIT	1X, I2	Switch to indicate if nitrogen routines are used. 0: nitrogen subroutines are not used, assumes adequate nitrogen (default). 1: nitrogen subroutines are used.
EFFIRR	1X, F6.2	Irrigation system efficiency, fraction.
DSOIL	1X, F5.2	Irrigation management depth, m.
THETAC	1X, F6.1	Available water triggering irrigation, %.
PHINT	1X, F6.2	Phyllochron interval (day degree). Default = 95 (CERES models).
IPHN	1X, I2	Indicates phenology model is to be used (default = 0), or that phenology stages are input (default = 1). Used in grain legume models only.
MULTYR	1X, I3	Indicates number of years of simulation under multiple year simulation option (Wheat and Maize models only).

EXAMPLES

"UFGA7801.SB8."

```
1- column numbers
1-------------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
1234567890123456789012345678901234567890123456789012345678901234567890123456
-------------------------------------------------------------------------------
UFGA7801 01 IRRIGATED                                   15   01
 166 166  29.90  0.914  4.00  2 00   0.75 00.50   40.0  00.00  0
UFGA7801 02 NON - IRRIGATED                             15   01
 166 166  29.90  0.914  4.00  1 00   0.75 00.50   40.0  00.00  0
```

"KSAS8101.WH8."

```
1- column numbers
1-------------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
1234567890123456789012345678901234567890123456789012345678901234567890123456
-------------------------------------------------------------------------------
KSAS8101  1 DRYLAND  - 0 KG N/HA                        18  488
 279 289 162.00  0.000  5.50  1  1   0.00  0.00    0.0  95.00  0
KSAS8101  2 DRYLAND  - 60 KG N/HA                       18  488
 279 289 162.00  0.000  5.50  1  1   0.00  0.00    0.0  95.00  0
KSAS8101  3 DRYLAND  - 180 KG N/HA SPLIT APPLICATION    18  488
 279 289 162.00  0.000  5.50  1  1   0.00  0.00    0.0  95.00  0
KSAS8101  4 IRRIGATED - 0 KG N/HA                       18  488
 279 289 162.00  0.000  5.50  2  1   0.00  0.00    0.0  95.00  0
KSAS8101  5 IRRIGATED - 60 KG N/HA                      18  488
 279 289 162.00  0.000  5.50  2  1   0.00  0.00    0.0  95.00  0
KSAS8101  6 IRRIGATED 180 KG N/HA SPLIT APPLICATION     18  488
 279 289 162.00  0.000  5.50  2  1   0.00  0.00    0.0  95.00  0
```

FILE9: genetic coefficient data & FILE0: crop coefficients

DESCRIPTION

FILE9 contains genetic coefficients which describe specific cultivar characteristics of each crop. FILE0 is used to provide coefficients for specific crops. Because these files vary so considerably among crops, users are referred to the documentation of each crop model for details of their coefficients and formats.

EXAMPLES FOR FILE9

"**GENETICS.SB9.**" (for soybean, only the first eight cultivars are shown)

```
1- column numbers
1-----------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234 56
-----------------------------------------------------------------------------
 01 BRAGG            07                          VARIETY 1, MAT. GRP 7
  5.0 11.80 13.50 1.0                           VARN1,VARN0,VARTH,VARDH
5.00  09.00 0.0 4.00 12.86 06.50 09.74 9.00 34.00  VARTHR(J),J=1,9
 47.50 12.00                                    VARTHR(J),J=10,11
 11.60   6.00  2.05 200.0  450.0                SHVAR,SDVAR,SDPDVR,PODVAR,FLWVAR
0.330 171.4 350.0                               TRIFOL,SIZELF,SLAVAR
 02 COBB             08                         VARIETY 2, MAT. GRP 8
 5.00 11.956 17.625 1.0                         VARN1,VARN0,VARTH,VARDH
5.00 09.00 0.00 3.50  12.86 4.50 9.56 5.50 34.00  VARTHR(J),J=1,9
 47.50 12.00                                    VARTHR(J),J=10,11
11.0     5.5  2.00  250.0   600.0               SHVAR,SDVAR,SDPDVR,PODVAR,FLWVAR
0.330 157.7 350.                                TRIFOL,SIZELF,SLAVAR
 03 WAYNE            03                         VARIETY 3,MAT. GRP 3
  5.0 10.43 6.00 1.0                            VARN1,VARN0,VARTH,VARDH
5.00 09.00 0.00 7.00 12.86 6.0 11.437 18.50 34.00 VARTHR(J),J=1,9
 40.50 12.00                                    VARTHR(J),J=10,11
 11.00    6.0   2.20 130.0  260.0               SHVAR,SDVAR,SDPDVR,PODVAR,FLWVAR
0.420 173.47 350.0                              TRIFOL,SIZELF,SLAVAR
 06 RANSOM           07                         VARIETY 6, MAT. GRP 7
  5.0 12.125 6.75  1.0                          VARN1,VARN0,VARTH,VARDH
5.00  9.00 0.0 7.61 12.86 6.50 12.06 12.06 34.00  VARTHR(J),J=1,9
 46.18  12.00                                   VARTHR(J),J=10,11
 11.25    5.5  2.2  200.0  400.0                SHVAR,SDVAR,SDPDVR,PODVAR,FLWVAR
0.360 171.4 350.0                               TRIFOL,SIZELF,SLAVAR
 08 FORREST          05                         VARIETY 8, MAT. GRP 5
  5.0 12.09 04.62 1.0                           VARN1,VARN0,VARTH,VARDH
5.00  9.00 0.0 8.81 12.86 6.00 12.46 12.46 34.00  VARTHR(J),J=1,9
 42.91  12.00                                   VARTHR(J),J=10,11
 11.50    5.8   2.2  200.0  400.0               SHVAR,SDVAR,SDPDVR,PODVAR,FLWVAR
0.360 171.4 350.0                               TRIFOL,SIZELF,SLAVAR
 09 WILLIAMS         03                         VARIETY 9,MAT. GRP 3
  5.0 10.43 6.00 1.0                            VARN1,VARN0,VARTH,VARDH
5.00 09.00 0.00 7.40 12.86 6.0 11.437 17.00 34.00 VARTHR(J),J=1,9
 43.00 12.00                                    VARTHR(J),J=10,11
 11.00    6.0   2.20 120.0  240.0               SHVAR,SDVAR,SDPDVR,PODVAR,FLWVAR
0.350 188.37 350.0                              TRIFOL,SIZELF,SLAVAR
 10 WILLIAMS-82      03                         VARIETY 10,MAT. GRP 3
  5.0 10.43 6.00 1.0                            VARN1,VARN0,VARTH,VARDH
5.000 09.00 0.00 7.40 12.86 6.0 11.437 17.00 34.00 VARTHR(J),J=1,9
 43.00 12.00                                    VARTHR(J),J=10,11
 11.00    6.0   2.20 120.0  240.0               SHVAR,SDVAR,SDPDVR,PODVAR,FLWVAR
0.350 188.37 350.0                              TRIFOL,SIZELF,SLAVAR
 11 EVANS            00                         VARIETY 11,MAT. GRP 00
  5.0 09.500 2.0  1.0                           VARN1,VARN0,VARTH,VARDH
5.000 09.00 0.00 3.50 12.86 7.0 10.67 25.50 34.00 VARTHR(J),J=1,9
 44.00  12.00                                   VARTHR(J),J=10,11
  9.50    6.00  2.20 160.0  320.0               SHVAR,SDVAR,SDPDVR,PODVAR,FLWVAR
0.380 173.47 360.0                              TRIFOL,SIZELF,SLAVAR
```

"GENETICS.MZ9." (for maize, only the first fifty cultivars are shown)

```
1- column numbers
1-----------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234 56
------------------------------------ -----------------------------------
 1 CORNL281          110.00 0.3000 685.00 825.40  6.600
 2 CP170             120.00 0.0000 685.00 825.40 10.000
 3 LG11              125.00 0.0000 685.00 825.40 10.000
 4 F7 X F2           125.00 0.0000 685.00 825.40 10.000
 5 PIO 3995          130.00 0.3000 685.00 825.40  8.600
 6 INRA              135.00 0.0000 685.00 825.40 10.000
 7 EDO               135.00 0.3000 685.00 825.40 10.400
 8 A654 X F2         135.00 0.0000 685.00 825.40 10.000
 9 DEKALB XL71       140.00 0.3000 685.00 825.40 10.500
10 F478 X W705A      140.00 0.0000 685.00 825.40 10.000
11 DEKALBXL45        150.00 0.4000 685.00 825.40 10.150
12 PIO 3382          160.00 0.7000 890.00 750.00  8.500
13 B59*OH43          162.00 0.8000 685.00 784.00  6.900
14 F16 X F19         165.00 0.0000 685.00 825.40 10.000
15 WASHINGTON        165.00 0.4000 715.00 750.00 11.000
16 B14XOH43          172.00 0.3000 685.00 825.40  8.500
17 R1*(N32*B14)      172.00 0.8000 685.00 825.40 10.150
18 B60*R71           172.00 0.8000 685.00 710.40  7.700
19 WF9*B37           172.00 0.8000 685.00 825.40 10.150
20 B59*C103          172.00 0.8000 685.00 825.40 10.150
21 Garst 8702        175.00 0.2000 960.00 778.00  6.000
22 B14*C103          180.00 0.5000 685.00 825.40 10.150
23 B14*C131A         180.00 0.5000 685.00 825.40 10.150
24 PIO 3720          180.00 0.8000 685.00 825.40 10.000
25 WASH/GRAIN-1      185.00 0.4000 795.00 760.00 12.000
26 A632 X W117       187.00 0.0000 685.00 825.40 10.000
27 Garst 8750        190.00 0.2000 930.00 810.00  6.300
28 TAINAN-11         200.00 0.8000 670.00 790.00  6.800
29 PIO 3541          200.00 0.3000 800.00 700.00  8.500
30 PIO 3707          200.00 0.7000 800.00 590.00  6.300
31 PIO 3475          200.00 0.7000 800.00 725.00  8.600
32 PIO 3382          200.00 0.7000 800.00 650.00  8.500
33 PIO 3780          200.00 0.7600 685.00 600.00  9.600
34 PIO 3780*         200.00 0.7600 685.00 725.00  9.600
35 McCurdy 84aa      200.00 0.3000 940.00 700.00  8.000
36 C281              202.00 0.3000 685.00 825.40  5.800
37 SWEET CORN        210.00 0.5200 625.00 825.00 10.000
38 Garst 8555        215.00 0.4000 890.00 800.00  9.000
39 PIO 3901          215.00 0.7600 600.00 560.00  9.000
40 B8*153R           218.00 0.3000 760.00 595.00  8.800
41 Garst 8808        220.00 0.4000 780.00 780.00  8.500
42 B73 X MO17        220.00 0.5200 880.00 730.00 10.000
43 PIO 511A          220.00 0.3000 685.00 645.00 10.500
44 W69A X F546       240.00 0.3000 685.00 825.40 10.000
45 A632 X VA26       240.00 0.3000 685.00 825.40 10.000
46 W64A X W117       245.00 0.0000 685.00 825.40  8.000
47 PIO 3147          255.00 0.7600 685.00 834.00 10.000
48 WF9*B37           260.00 0.8000 710.00 825.40  6.500
49 NEB 611           260.00 0.3000 720.00 825.00  9.000
50 PV82S             260.00 0.5000 750.00 600.00  8.500
```

EXAMPLE FOR FILE0

"CROPPARM.SB0." (for soybean)

```
1- column numbers
1-----------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444445555555555666666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456
-----------------------------------------------------------------------------
48.27 40.30 1.67 -0.0173        PARMAX,PHTMAX,PHFAC1,PHFAC2
-1.599 1.132 -0.123             CNIT1,CNIT2,CNIT3
0.0 0.0 5.00 0.0 24.0 1.0 34.0 1.0 45.00 0.0 50.0 0.0  XPHOTO,YPHOTO
1.50 1.77 30                    PHPT1,PHPT2,NLITE
0.0 0.0 0.1 0.1243 0.2 0.1917 0.3 0.2564 0.4 0.3183 0.5 0.3773
0.6 0.4336 0.7 0.4870 0.8 0.5376 0.9 0.5855 1.0 0.6305 1.1 0.6728
1.2 0.7122 1.3 0.7488 1.4 0.7826 1.5 0.8137 1.6 0.8419 1.8 0.8899
2.0 0.9267 2.2 0.9523 2.4 0.9667 2.6 0.9717 2.8 0.9785 3.0 0.9837
3.5 0.9918 4.0 0.9959 4.5 0.9979 5.0 0.9989 7.5 1.0000 8.0 1.0000
3.5E-04 0.0040                  RES30C,R30C2
1.61 1.44 1.37 2.08 1.45 1.49  AGRLF,AGRSTM,AGRRT,AGRSD1,AGRSD2,AGRSH
0.68                            ALPHBR
0.294 0.125 0.128 0.035         PROLFI,PROLFF,PROSTI,PROSTF
0.092 0.056 0.196 0.056         PRORTI,PRORTF,PROSHI,PROSHF
1.00 0.20 0.05                  SENRTE,SENRT2,SENDAY
0.0 0.0 5.0 0.0 14.0 0.12 30.0 0.12          XSTAGE,SENPOR
3.0 0.0 5.0 0.2 10.0 0.6 30.0 0.6            XSENMX,SENMAX
0.48 0.22                       FRSTMF,FRLFF
1.00                            ATOP
7                               NVSPT
0.0 .430 1.5 .430 3.3 .40 5.0 .350 7.8 .34 10.5 .31 30. .31   XLEAF, YLEAF
0.0 .090 1.5 .130 3.3 .23 5.0 .300 7.8 .36 10.5 .51 30. .51   XSTEM, YSTEM
180. 350. 171.4                 FINREF,SLAREF,SIZREF
0.3  950. 280.0  0.40           CONGR1,SLAMAX,SLAMIN,THICKN
5.0                             VSSINK
0.0 0.0 1.0 18.3 2.0 48.6 3.0 99.6 4.0 178.2 5.0 285.7   XVGROW,YVBRAG
25.0 7500 0.0006 0.1 0.01       RTDEPI,RFAC1,RTSEN,RLDSM,RTSDF
0.0 0.15 3.0 0.15 6.0 0.15 30.0 0.15   XRTFAC,YRTFAC
80.0 0.60 0.3 0.00              THRESH,SETMAX,SRMAX,RFLWAB
10 5  0.00 0.398                LNGSH,LAGSD,SHTHIC,SDPRO
-0.4495 0.125 -0.00269          CONSD1,CONSD2,CONSD3
30.0 35.0 7.0 45.0              TOPT1,TOPT2,TPHMIN,TPHMAX
1 1 1 1 2 1 2 3 3 2 2 5         NTYACC(JJ),JJ=1,12
1 1 1 3 4 5 6 6 6 6 6 11        NPRIOR(JJ),JJ=1,12
0.12 0.50                       WTNEW,PORPT
3.6765E-5                       WTFAC
-2.22 -5.00                     FREEZ1,FREEZ2
14                              NBPDAT
-50.,0.,6.37,7.22,10.,12.78,15.55,21.11,26.67,32.22,37.78,40.56,40.91,80. BPTMP
0.,0.,0.,0.071,0.303,0.586,0.788,0.980,01.00,0.828,0.505,0.061,00.00,0.  BPPHP
10                              NXYTEM
-50. 00.00 14.00 20.00 27.00 32.22 37.78 40.56 40.91  80.0   XTEMPD
 00. 00.00 00.00 01.00 01.00 0.828 0.505 0.061 0.000  00.0   YTEMPD
5                               NXYSLA
-50.00 00.00 15.00 25.00 60.00  XSLA
 00.45 00.45 00.45 01.00 01.00  YSLA
12                              NPSLW
0.0     0.001  0.0015  0.002  0.0025  0.003
```

```
0.0035  0.004  0.005   0.006  0.008   0.010                XPSLW
0.162  0.679  0.790  0.867  0.923  0.966
1.000  1.027  1.069  1.100  1.141  1.167                   YPSLW
05.00                          DAYMIN
01.50                            RWUEP1
```

CHAPTER 6

MODEL VALIDATION FILE STRUCTURES

FILEA: measured crop summary data (may vary by crop)

DESCRIPTION

For each treatment of each experiment, crop experiment data may differ. FILEA contains crop measured field data for each treatment averaged over all replications. The measured field data are needed for the standard outputs which list simulated and measured data side-by-side. FILEA may vary slightly among the different crops. For that reason, we have listed FILEA formats for maize, wheat, soybean, and peanut. Note that the files are very similar, and modelers are asked to conform to these formats as closely as possible to facilitate model linkage into DSSAT.

DATA FORMATS FOR MAIZE

Variable Name	FORTRAN Format	Description
INSTE	A2	Code for institute ID.
SITEE	A2	Code for site ID.
YEAR	A2	Year number, last two digits.
EXPTNO	I2	Experiment number.
TRTNO	1X, A2	Treatment number.
XYIELD	1X, F7.0	Actual field-measurement grain yield dry weight basis, kg/ha.
XGRWT	1X, F7.4	Field-measured kernel dry weight, g/kernel.
XGPSM	1X, F6.0	Field-measured grain number, grains/m^2.
XGPE	1X, F4.0	Field-measured grain number, grains/ear.
XLAI	1X, F5.2	Field-measured leaf area index at silking, m^2/m^2.
XBIOM	1X, F6.0	Field-measured; aboveground dry biomass at maturity, kg/ha.
XSTRAW	1X, F6.0	Measured stover dry weight at maturity, kg/ha.
ISLKJD	1X, I3	Field-measured silking date, Julian day of year.
MATJD	1X, I3	Field-measured physiological maturity date, Julian day of year.
Start line 2		
GRPCTN	F6.2	Measured nitrogen concentration in grain at maturity, %.
XTOTNP	1X, F5.1	Measured crop nitrogen content at maturity, kg/ha.
XAPTNP	1X,F5.1	Measured stover nitrogen content at maturity, kg/ha.
XGNUP	1X, F5.1	Measured grain nitrogen content at maturity, kg/ha.

EXAMPLE FOR MAIZE

"IBWA8301.MZA"

```
1- column numbers
1-----------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234456
-----------------------------------------------------------------------------
IBWA83 1  1   2991.  0.2034  1245. 215.  3.24  7801.  5274.  48 108
  0.91  37.6  14.6  23.0
IBWA83 1  2   6064.  0.2178  2351. 406.  4.36 12664.  7539.  48 104
  1.00  73.3  22.2  51.1
IBWA83 1  3   7679.  0.2412  2692. 465.  4.58 15722.  9233.  47 105
 1.52  150.8  52.0  98.8
IBWA83 1  4   2528.  0.2358   909. 157.  3.18  6912.  4775.  48 102
  0.88  32.3  13.5  18.8
IBWA83 1  5   5276.  0.2502  1783. 308.  3.74 11095.  6637.  45 102
  1.03  66.7  20.7  46.0
IBWA83 1  6   7998.  0.2840  2380. 411.  4.60 15655.  8897.  43 102
  1.54 145.9  41.6 104.3
```

DATA FORMATS FOR WHEAT

Variable Name	FORTRAN Format	Description
INSTE	A2	Code for institute ID.
SITEE	A2	Code for site ID.
YEAR	A2	Year number, last two digits.
EXPTNO	I2	Experiment number.
TRTNO	1X, I2	Treatment number.
XYIELD	1X, F7.0	Actual field-measured grain yield dry weight basis, kg/ha.
XGRWT	1X, F7.4	Field-measured kernel dry weight, g/kernel.
XGPSM	1X, F6.0	Field-measured grain number, grains/m^2.
XGPE	1X, F4.0	Field-measured grain number, grains/ear.
XLAI	1X, F5.2	Field-measured leaf area index at anthesis, m^2/m^2.
XBIOM	1X, F6.0	Field-measured, aboveground dry biomass at maturity, kg/ha.
XSTRAW	1X, F6.0	Measured straw and chaff dry weight at maturity kg/ha.
ISLKJD	1X, I3	Field-measured anthesis date, Julain day of year.
MATJD	1X, I3	Field-measured physiological maturity date, Julian day of year.
Start line 2		
GRPCTN	F6.2	Measured nitrogen concentration in grain at maturity, %.
XTOTNP	1X, F5.1	Measured crop nitrogen content at maturity, kg/ha.
XAPTNP	1X, F5.1	Measured stover nitrogen content at maturity, kg/ha.
XGNUP	1X, F5.1	Measured grain nitrogen content at maturity, kg/ha.

EXAMPLE FOR WHEAT

"KSAK8101.WHA"

```
1- column numbers
1-----------------------------------------------------------------------------
1===> 1111111111222222222233333333334444444444555555555566666666667777777
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456
-----------------------------------------------------------------------------
KSAS8101  1   3317. 28.0     8017.   18.  1.02  5994.  3677. 141 174
  1.91  69.2  14.9  44.4
KSAS8101  2   3330. 24.2    13760.   22.  1.78 10178.  6848. 141 174
  1.91 103.2  39.5  63.7
KSAS8101  3   4521. 23.4    19321.   24.  2.99 12649.  8128. 141 174
  2.21 166.6  66.7  99.9
KSAS8101  4   1438. 28.1     5117.   18.  0.81  3926.  2488. 141 174
  1.86  37.7  11.0  26.7
KSAS8101  5   3025. 23.9    12657.   20.  1.82  9424.  6399. 141 174
  1.88  87.8  31.0  56.8
KSAS8101  6   4695. 23.1    20325.   24.  2.88 13064.  8369. 141 174
  2.04 166.5  71.0  95.5
```

DATA FORMATS FOR SOYBEAN

Variable Name	FORTRAN Format	Description
INSTE	A2	Code for institute ID.
SITEE	A2	Code for site ID.
YEAR	A2	Year number, last two digits.
EXPTNO	I2	Experiment number.
TRTNO	I2	Treatment number.
XYIELD	1X, F7.0	Actual field-measured grain yield dry weight basis, kg/ha.
XSDWT	1X, F7.4	Field-measured seed dry weight, g/seed.
XSDSM	1X, F6.0	Field-measured seed number, seed/m^2.
XSPP	1X, F4.0	Field-measured seed per pod, seed/pod.
XLAIR4	1X, F5.2	Leaf area index of all leaves at R4 stage, m^2/m^2.
XBIOM	1X, F6.0	Field-measured, aboveground dry biomass at maturity, kg/ha.
XSTALK	1X, F6.0	Measured stem dry weight at maturity, kg/ha.
IFLRJD	1X, I3	Field-measured flowering date (R1 stage), Julian day of year.
MATJD	1X, I3	Field-measured physiological maturity date (R7 stage), Julian day of year.

EXAMPLE FOR SOYBEAN

"UFGA7801.SBA"

```
1- column numbers
1-----------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
123456789012345678901234567890123456789012345678901234567890123456789012345678
-----------------------------------------------------------------------
UFGA7801.SBA
UFGA7801  1   3041.   .1440  2223. 1.96  4.67  6068.  1958. 211 282
233 233   4009.
UFGA7801  2   1178.   .1230   969. 1.85  4.50  3491.  1756. 211 282
233 233   1602.
```

DATA FORMATS FOR PEANUT

Variable Name	FORTRAN Format	Description
Line 1		
INSTE	A2	Code for institute ID.
SITEE	A2	Code for site ID.
YEAR	A2	Year number, last two digits.
EXPTNO	I2	Experiment number.
TRTNO	I2	Treatment number.
XYIELD	1X, F7.0	Actual field-measured grain yield dry weight basis, kg/ha.
XSDWT	1X, F7.4	Field-measured seed dry weight, g/seed.
XSDSM	1X, F6.0	Field-measured seed number, seed/m^2.
XSPP	1X, F4.0	Field-measured seed per pod, seed/pod.
XLAIR4	1X, F5.2	Leaf area index of all leaves at R4 stage, m^2/m^2.
XBIOM	1X, F6.0	Field-measured, aboveground dry biomass at maturity, kg/ha.
XSTALK	1X, F6.0	Measured stem dry weight at maturity, kg/ha.
IFLRJD	1X, I3	Field-measured flowering date (R1 stage), Julian day of year.
MATJD	1X, I3	Field-measured physiological maturity date (R7 stage), Julian day of year.
Line 2		
IFFSP	I3	Field measured first pod date (R3 stage: 50% of plants with a pod 0.5 cm long at one of the four uppermost nodes with a completely unrolled leaf). {The model actually predicts first date of pod set on any node which is earlier than R3}.
IFFS	I3	Field measured full pod date (R4 stage: 50% of plants with a pod 2.0 cm long at one of the four uppermost nodes with a completely unrolled leaf.
PPYLD	F6.0	Field measured pod yield on a dry weight basis at harvest maturity, kg/ha.

EXAMPLE FOR PEANUT

```
"UFGA8601.PNA"
1- column numbers
1--------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
123456789012345678901234567890123456789012345678901234567890123456789012345678
--------------------------------------------------------------------------
UFGA8601  1   3843.   .6066   633. 1.55  7.51 12512.  5076.  181 294
 210 238   4983.  48.50
UFGA8601  2   4162.   .6101   682. 1.56  7.51 13477.  5330.  181 294
 210 238   5251.  69.00
```

FILEB: observed data for graphics

DESCRIPTION

FILEB allows observed data to be plotted with simulated results for each treatment simulated. Data for all treatments of an experiment are stored in one file. The first line is used as the header line to identify the treatment. On the second line, the first variable identifies the number of state variables for which there are matching field data, and the rest of the variables on this line are pointers which indicate the state variable number for each column of data. Starting with the third line, there is one line of data for each observation date recorded in the MDS. Replication data for each treatment can be included by using a different line of data for each replication. A "-1" on the line immediately following a data line indicates the end of data for a specific treatment. These files may vary slightly among crops. For example, V-stage in soybeans replaces leaf number in maize, but these variables are similar in concept. In the DSSAT, this file will be created automatically for each experiment by retrieving the data from the MDS and creating a FILEB for each experiment.

DATA FORMATS FOR SOYBEAN & PEANUT

Variable	Columns	Format	Description
Line 1			
INSTE	11-12	A2	Code for institute ID.
SITEE	24-25	A2	Code for site ID.
EXPTNO	37-38	I2	Experiment number.
YEAR	50-51	I2	Year of experiment, last two digits.
TRTNO	62-63	I2	Treatment number.

Line 2

2512345678910111213141516171819202122232425

The first number "25" corresponds to the total number of field measured variables which can be plotted by the graphics program as a function of day of year or days after planting. The graphics program will show the predicted values through continuous lines and measured variables are overlaid as data points on the same graph. The numbers "1-25" represent the different variable identifiers as shown in file "GLABEL.DAT" and described in the following table. FILEB contains the field measured data; if a variable has not been measured or is missing, a ".", "0" or "-9" is entered in FILEB. Although the actual data are read as "free format," it is recommended to use the following format when creating FILEB. Be careful to enter all data correctly and not to add or omit any numbers. Because of the free format used by the graphics program to read data, the results will be erroneous.

Variable	Columns	Format	Description
LINE 3,...N			
JULDATE	1-4	I4	Julian date of growth analysis sampling.
VSTAGE	6-11	F6.2	Average vegetative growth Stage (V-stage for this treatment.
LAI	13-17	F5.2	Average leaf area index (LAI) for this treatment, m^2/m^2.
PODNUM	19-24	F7.1	Average number of pods for this treatment, #pods/m^2.
STDRYWT	26-32	F7.1	Average stem dry weight, including petiole dry weight for this treatment, kg/ha
SDDRYWT	34-40	F7.1	Average seed dry weight for this treatment, kg/ha.
LFDRYWT	42-48	F7.1	Average leaf dry weight (leaf dry weight only) for this treatment, kg/ha.
CNDRYWT	50-57	F7.1	Average canopy dry weight (leaf blade, stem, petiole, seed, and empty shell dry weight) for this treatment, kg/ha.
PODWT	59-65	F7.1	Average pod dry weight (empty shell and seed dry weight) for this treatment, kg/ha.
SHELLWT	67-73	F7.1	Average empty shell dry weight for this treatment, kg/ha.
ROOTWT	75-81	F7.1	Average root dry weight for this treatment, kg/ha.
SEEDNO	83-88	F7.1	Average number of seeds for this treatment, # seeds/m^2.
HI	90-94	F5.3	Average number of seeds for this treatment, # seeds/m^2.
SHELL	96-100	F5.1	Average shelling percentage (100 * seed dry weight/(empty shell + seed dry weight)) for this treatment, %.
SLA	102-107	F6.1	Average specific leaf area (100,00 * leaf area index/leaf dry weight) for this treatment, cm^2/g.
SEEDSIZE	102-114	F6.1	Average size of a single seed for this treatment, mg.
%NITRO	116-120	F5.2	Average percentage nitrogen content of leaf blades (dry weight basis) for this treatment, %.
STRESS	122-126	F5.2	Relative factor to indicate drought stress on a zero (full stress) to one (no stress) scale, no measured equivalent for this treatment.
RTDENS1	128-132	F5.2	Average root length density for soil layer 1 (as defined in FILE2 and FILE5) for this treatment, cm/cm^3.
RTDENS2	133-137	F5.2	Average root length density for soil layer 2 (as defined in FILE2 and FILE5) for this treatment, cm/cm^3.

RTDENS3	138-142	F5.2	Average root length density for soil layer 3 (as defined in FILE2 and FILE5) for this treatment, cm/cm^3.
RTDENS4	143-147	R5.2	Average root length density for soil layer 4 (as defined in FILE2 and FILE5) for this treatment, cm/cm^3.
RTDENS5	148-152	F5.2	Average root length density or soil layer 5 (as defined in FILE2 and FILE5) for this treatment, cm/cm^3.
RTDENS6	153-157	F5.2	Average root length density for soil layer 6 (as defined in FILE2 and FILE5) for this treatment, cm/cm^3.
RTDENS7	158-162	F5.2	Average root length density for soil layer 7 (as defined in FILE2 and FILE5) for this treatment, cm/cm^3.
RTDENS8	163-167	F5.2	Average root length density for soil layer 8 (as defined in FILE2 and FILE5) for this treatment, cm/cm^3.

LINE N+1

-1 — The "-1" defines the end of the growth analysis data for this treatment.

EXAMPLE FOR SOYBEAN

"UFGA7801.SBB"

```
1-- column numbers
1----------------------------------------------------------------------------------------------------
1---- 1111111111222222222233333333334444444444555555555566666666667777777777888888888899999
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234
----------------------------------------------------------------------------------------------------
UFGA7801.SBB
INST_ID :UF  SITE_ID: GA  EXPT_NO: 01  YEAR : 1978  TRT_NO:  1
12 1 2 3 4 5 6 7 8 9 13 14 12
194.    .0   .89      .0   178.0      .0   266.0    444.0     0.0     0.0   0.00  334.6  0.0
201.    .0  1.28      .0   300.0      .0   366.0    667.0     0.0     0.0   0.00  349.7  0.0
208.    .0  1.91      .0   551.0      .0   656.0   1207.0     0.0     0.0   0.00  291.2  0.0
215.    .0  2.86      .0   943.0      .0   843.0   1786.0     0.0     0.0   0.00  339.3  0.0
222.    .0  4.17      .0  1561.0      .0  1187.0   2748.0     0.0     0.0   0.00  351.3  0.0
229.    .0  3.90      .0  1956.0      .0  1204.0   3160.0     0.0     0.0   0.00  323.9  0.0
236.    .0  4.66      .0  2947.0      .0  1723.0   4792.0   123.0   123.0   0.00  270.5  0.0
243.    .0  4.47      .0  3144.0      .0  1772.0   5224.0   308.0   308.0   0.00  252.3  0.0
250.    .0  4.44      .0  3303.0   182.0  1631.0   5740.0   805.0   623.0  22.60  272.2  0.030
257.    .0  3.99      .0  3326.0   754.0  1568.0   6507.0  1613.0   859.0  46.75  254.5  0.116
264.    .0  4.67      .0  3657.0  1912.0  1769.0   8586.0  3161.0  1249.0  60.43  264.0  0.222
271.    .0  2.83      .0  2732.0  2223.0  1180.0   7144.0  3232.0  1009.0  68.78  239.8  0.311
278.    .0  2.09      .0  2515.0  2730.0   858.0   7136.0  3783.0  1033.0  72.55  243.6  0.383
285.    .0   .47      .0  1851.0  2913.0   170.0   5866.0  3845.0   932.0  75.76  276.5  0.497
292.    .0   .09      .0  2064.0  3169.0    34.0   6270.0  4172.0  1003.0  75.96  264.7  0.505
-1
INST_ID :UF  SITE_ID: GA  EXPT_NO: 01  YEAR : 1978  TRT_NO:  2
12 1 2 3 4 5 6 7 8 9 13 14 12
194.    .0   .75      .0   160.0      .0   244.0    405.0     0.0     0.0   0.00  307.4  0.0
201.    .0  1.08      .0   251.0      .0   311.0    563.0     0.0     0.0   0.00  347.3  0.0
208.    .0  1.81      .0   535.0      .0   626.0   1161.0     0.0     0.0   0.00  289.1  0.0
215.    .0  3.29      .0  1080.0      .0   974.0   2054.0     0.0     0.0   0.00  337.8  0.0
```

222.	.0	4.38	.0	1663.0	.0	1261.0	2923.0	0.0	0.0	0.00	347.3	0.0
229.	.0	4.30	.0	2083.0	.0	1392.0	3475.0	0.0	0.0	0.00	308.9	0.0
236.	.0	4.21	.0	2556.0	.0	1517.0	4184.0	112.0	112.0	0.00	277.5	0.0
243.	.0	4.50	.0	2673.0	.0	1439.0	4431.0	319.0	319.0	0.00	312.7	0.0
250.	.0	2.09	.0	1998.0	42.0	838.0	3104.0	268.0	226.0	15.67	249.4	0.014
257.	.0	3.24	.0	2650.0	253.0	1220.0	4530.0	661.0	408.0	38.28	265.6	0.056
264.	.0	2.30	.0	2609.0	471.0	931.0	4440.0	901.0	430.0	52.28	247.0	0.106
271.	.0	1.14	.0	2113.0	775.0	498.0	3812.0	1200.0	425.0	64.58	228.9	0.203
278.	.0	.85	.0	1905.0	782.0	371.0	3398.0	1122.0	340.0	69.70	229.1	0.230
285.	.0	.53	.0	1922.0	1149.0	236.0	3732.0	1574.0	425.0	73.00	224.5	0.308
292.	.0	.07	.0	1590.0	1206.0	30.0	3250.0	1630.0	424.0	73.99	233.3	0.371

-1

DATA FORMATS FOR WHEAT

Variable	Columns	Format	Description
LINE 1			
INSTE	11-12	A2	Code for institute ID.
SITEE	24-25	A2	Code for site ID.
EXPTNO	37-38	I2	Experiment number.
YEAR	50-51	I2	Year of experiment (last two digits.)
TRTNO	62-63	I2	Treatment number.

LINE 2

10 1 2 3 4 5 6 7 8 9 10

The first number "10" corresponds to the total number of field measured variables which car be plotted by the graphics program as a function of day of year or days after planting. The graphics program will show the predicted values through continuous lines and measured variables are overlaid as data points on the same graph. The numbers "1-10" represent the different variable identifiers as shown in file "GLABEL.DAT" and described in the following table. FILEB contains the field measured data; if a variable has not been measured or is missing, a ".", "0", or "-9" is entered in FILEB. The actual data are read as free format, represented by an asterisk (*).

LINE 3,...N			
JULDATE	*	*	Julian date of growth analysis sampling.
SUMDTT	*	*	Growth Stage (C/day).
BIOMS	*	*	Biomass (g/m^2).
TILLERS	*	*	Number of tillers.
LAI	*	*	Leaf area index.
ROOT	*	*	Root dry weight (g/plant).
STEM	*	*	Stem dry weight (g/plant).
GRAIN	*	*	Grain dry weight (g/plant).
LEAF	*	*	Leaf dry weight (g/plant).
RTDEP	*	*	Root depth, cm.
DPFACT	*	*	Daily partitioning factor for shoot.

LINE N+1

-1 — The "-1" defines the end of the growth analysis data for this treatment.

EXAMPLE FOR WHEAT

"KSAS8101.WHB" (only the first three treatments are shown)

```
1- column numbers
1--------------------------------------------------------------------------------
1===>  1111111111222222222233333333334444444444555555555566666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456
--------------------------------------------------------------------------------
INST_ID :KS  SITE_ID: AS  EXPT_NO: 01  YEAR : 1981  TRT_NO:  1
6 4 6 7 8 2 3
344 0.00 0.000 0.000 0.037     5.90   227.
 61 0.06 0.000 0.000 0.061     9.90   275.
 71 0.06 0.000 0.000 0.077    12.40   292.
 81 0.13 0.000 0.000 0.105    17.00   454.
 92 0.20 0.000 0.000 0.139    22.50   454.
103 0.31 0.000 0.000 0.209    33.80   616.
115 0.68 0.139 0.000 0.472    98.70   632.
125 0.96 0.267 0.000 0.753   162.00   664.
138 1.02 1.023 0.000 1.400   469.60   551.
152 0.33 1.380 0.000 0.753   512.70   437.
162 0.00 1.026 0.957 0.696   508.20   340.
168 0.00 0.993 1.325 0.680   584.80   2 3.
175 0.00 0.393 1.434 0.723   599.40   421.
-1
INST_ID :KS  SITE_ID: AS  EXPT_NO: 01  YEAR : 1981  TRT_NO:  2
6 4 6 7 8 2 3
344 0.00 0.000 0.000 0.065    10.50   437.
 61 0.08 0.000 0.000 0.086    14.00   389.
 71 0.08 0.000 0.000 0.092    14.90   583.
 81 0.17 0.000 0.000 0.132    21.40   599.
 92 0.29 0.000 0.000 0.166    26.80   599.
103 0.53 0.000 0.000 0.322    52.00   842.
115 1.14 0.231 0.000 0.765   160.90   907.
125 1.84 0.427 0.000 1.167   260.00   972.
138 1.78 1.623 0.000 1.973   725.40   826.
152 0.69 2.390 0.000 1.500   891.80   713.
162 0.00 1.636 1.438 1.070   793.80   535.
168 0.00 1.773 2.027 1.147   963.90   599.
175 0.00 1.870 2.062 1.220  1017.80   616.
-1
INST_ID :KS  SITE_ID: AS  EXPT_NO: 01  YEAR : 1981  TRT_NO:  3
6 4 6 7 8 2 3
344 0.00 0.000 0.000 0.063    10.10   405.
 61 0.08 0.000 0.000 0.086    13.90   389.
 71 0.16 0.000 0.000 0.147    23.80   632.
 81 0.21 0.000 0.000 0.166    26.80   745.
 92 0.46 0.000 0.000 0.244    39.50   794.
103 0.82 0.000 0.000 0.444    71.70  1102.
115 1.73 0.245 0.000 0.918   187.90  1069.
125 3.60 0.610 0.000 1.663   369.60  1118.
138 2.99 1.783 0.000 2.847   920.30  1021.
152 1.24 2.960 0.000 3.030  1172.30   842.
162 0.00 2.324 1.769 1.548  1118.40   680.
168 0.00 2.100 2.303 1.493  1143.80   713.
175 0.00 2.197 2.799 1.443  1264.90   697.
-1
```

DATA FORMATS FOR MAIZE

Variable	Columns	Format	Description
LINE 1			
INSTE	11-12	A2	Code for institute ID.
SITEE	24-25	A2	Code for site ID.
EXPTNO	37-38	I2	Experiment number.
YEAR	50-51	I2	Year of experiment (last two digits.)
TRTNO	62-63	I2	Treatment number.

LINE 2

13 1 2 3 4 5 6 7 8 9 10 11 12 13

The first number "13" corresponds to the total number of field measured variables which can be plotted by the graphics program as a function of day of year or days after planting. The graphics program will show the predicted values through continuous lines and measured variables are overlaid as data points on the same graph. The numbers "1-13" represent the different variable identifiers as shown in file "GLABEL.DAT" and described in the following table. FILEB contains the field measured data; if a variable has not been measured or is missing, a ".", "0", or "-9" is entered in FILEB. The actual data are read as free format, represented by an asterisk (*).

LINE 3,...N			
JULDATE	*	*	Julian date of growth analysis sampling.
SUMDTT	*	*	Growth Stage (C/day).
BIOMS	*	*	Biomass (g/m^2).
LINUM	*	*	Leaf number.
LAI	*	*	Leaf area index.
ROOT	*	*	Root dry weight (g/plant).
STEM	*	*	Stem dry weight (g/plant).
GRAIN	*	*	Grain dry weight (g/plant).
LEAF	*	*	Leaf dry weight (g/plant).
RTDEP	*	*	Root depth, cm.
DPFACT	*	*	Daily partitioning factor for shoot.
RTDNS1	*	*	Average root length density for soil layer 1 (as defined in FILE2 and FILE5) for this treatment, m/m^3.
RTDNS3	*	*	Average root length density for soil layer 3 (as defined in FILE2 and FILE5) for this treatment, m/m^3. m/m^3.
RTDNS5	*	*	Average root length density for soil layer 5 (as defined in FILE2 and FILE5) for this treatment, m/m^3.

FILE N+1

-1 — The "-1" defines the end of the growth analysis data for this treatment.

EXAMPLE FOR MAIZE

"IBWA8301.MZB" (only the first four treatments are shown)

```
1- column numbers
1-----------------------------------------------------------------------------
1===> 1111111111222222222233333333334444444444555555555566666666667777777
12345678901234567890123456789012345678901234567890123456789012345678901234 56
-----------------------------------------------------------------------------
INST_ID :IB  SITE_ID: WA  EXPT_NO: 01  YEAR : 1983  TRT_NO:  1
5 2 4 6 7 8
334    0.0   0.0    0.0    0.0    0.0
002   21.42  0.91   0.0    0.0    3.70
039  407.30  3.24  28.16   0.0   41.67
067  661.2   1.84  36.30   9.93  44.74
074  715.1   1.58  40.7   17.29  48.24
087  767.8   1.00  43.1   25.75  44.72
105  780.1   0.00  39.9   43.64  37.4
-1
INST_ID :IB  SITE_ID: WA  EXPT_NO: 01  YEAR : 1983  TRT_NO:  2
5 2 4 6 7 8
334    0.0   0.0    0.0    0.0    0.0
002   23.2   0.94   0.0    0.0    4.01
040  554.1   4.36  45.28   0.0   52.50
067 1029.8   2.96  65.68  30.23  55.34
074 1123.3   2.78  58.75  46.49  56.4
087 1229.8   2.38  55.72  70.14  46.24
105 1266.4   0.00   0.0   88.52   0.0
-1
INST_ID :IB  SITE_ID: WA  EXPT_NO: 01  YEAR : 1983  TRT_NO:  3
5 2 4 6 7 8
334    0.0   0.0    0.0    0.0    0.0
002   22.6   0.93   0.0    0.0    3.90
039  662.7   4.58  51.81   0.0   62.65
067 1110.53  3.33  67.08  37.88  63.22
074 1208.49  3.03  75.12  58.67  64.35
087 1528.9   2.51  70.00  95.92  58.95
105 1572.2   0.00   0.0  112.1    0.00
-1
INST_ID :IB  SITE_ID: WA  EXPT_NO: 01  YEAR : 1983  TRT_NO:  4
5 2 4 6 7 8
334    0.0   0.0    0.0    0.0    0.0
002   24.32  0.89   0.0    0.0    4.2
039  407.6   3.18  27.24   0.0   39.56
068  594.1   1.80  40.12   7.55  38.34
074  708.6   1.67  45.60  19.46  39.4
087  690.3   1.03  39.2   25.56  32.0
105  691.2   0.0    0.0   36.89   0.0
-1
```

CHAPTER 7

STANDARD MODEL OUTPUT FILES

Five files have been defined for standard output. Modelers may wish to use additional outputs in other files, but they must adhere to the variables and formats in these files so simulated and observed results can be linked to the graphics and analysis programs which are now being developed in the DSSAT. These files, OUT1, OUT2, OUT3, OUT4, and OUT5 are for summary output, simulated crop variables *vs.* time, simulated weather and soil water variables *vs.* time, simulated soil and plant nitrogen variables *vs.* time, and results of strategy evaluation simulation.

Files OUT1, OUT2, and OUT5 may vary slightly among crops. Sample output files for the CERES-Maize V2.1 and SOYGRO V5.42 models are given on the following pages. Source codes for CERES-Maize V2.1, CERES-Wheat V2.1, SOYGRO V5.42, and PNUTGRO V1.02 or other existing IBSNAT models can be obtained from IBSNAT for adaptation to new models.

NOTE: All footnoted items on pages 44-51 require the formats specified in each footnote so that those data can be read in by the graphic programs.

OUTPUT FILES FOR SOYBEAN

SAMPLE OUT1 FOR SOYBEAN

```
INPUT SUMMARY      RUN NO.   1        SIMULATION BEGINS : JUN 15

INST_ID: UF  SITE_ID: GA  EXPT_NO: 01  YEAR: 1978  TRT_NO:  1
EXPERIMENT   : BRAGG, IRRIGATED & NON-IRRIGATED
TREATMENT    : IRRIGATED
WEATHER SET  : GAINESVILLE (29.6N,82.4W), FLORIDA 1978
VARIETY      : BRAGG              MATURITY GROUP :  7
IRRIGATION   : ACCORDING TO THE FIELD SCHEDULE
PLANTING DATE: JUN 15 PLANTS/M2: 29.90 ROW SPACING: .914m PLANT SPACING: .037m

SOIL PROFILE DATA Millhopper Fine Sand (Loamy,silic,hyperth Gross. Paleudults)
SOIL ALBEDO  :  .18  U: 5.0  SWCON:  .50  CURVE NO.: 66.0  PHFAC3: .84
  DEPTH-m      LL     DUL    SAT   EXTR   INIT   ROOT   KSAT
  .00-  .05  .023    .086   .230   .063   .086  1.000  7.400
  .05-  .15  .023    .086   .230   .063   .086  1.000  7.400
  .15-  .30  .023    .086   .230   .063   .086   .498 15.800
  .30-  .45  .023    .086   .230   .063   .086   .294 28.000
  .45-  .60  .023    .086   .230   .063   .086   .294 28.000
  .60-  .90  .021    .076   .230   .055   .076   .380 27.600
  .90- 1.20  .020    .076   .230   .056   .076   .133 17.500
 1.20- 1.50  .027    .130   .230   .103   .130   .062   .300
 1.50- 1.80  .070    .258   .360   .188   .258   .031   .100
         ----------------------------------
   SUM mm   55.2   213.6  453.0  158.4  213.6

 RUN NO.   1        SIMULATION OUTPUT

 UF  GA  1978       IRRIGATED
```

DATE	CROP AGE	GROWTH STAGE	BIOMASS KG/HA	LAI	V-STAGE	WATER BALANCE COMPONENTS ES mm	EP mm	ET mm	RAIN mm	IRRIG mm	DROUGHT STRESS PHOTO	TURGOR
JUN 15	0	SOWING	0.	.00	.0	4.	0.	4.	0.	0.	.000	.000
JUN 21	6	EMERGENCE	19.	.03	.2	6.	0.	6.	2.	0.	.000	.000
JUN 26	11	UNIFOLIOL.	34.	.07	1.2	14.	1.	15.	10.	0.	.000	.000
JUN 26	11	END JUVEN.	34.	.07	1.2	14.	1.	15.	10.	0.	.000	.000
JUL 13	28	FLOWER IND	361.	.79	5.9	47.	19.	67.	127.	13.	.000	.028
AUG 1	47	FLOWERING	1691.	2.96	11.1	82.	67.	149.	299.	13.	.000	.000
AUG 20	66	FIRST POD	3775.	5.26	16.4	98.	138.	236.	518.	26.	.000	.000
AUG 26	72	END LEAF	4488.	5.30	18.1	101.	165.	267.	518.	52.	.000	.000
AUG 27	73	FULL POD	4606.	5.30	18.1	102.	171.	273.	518.	52.	.000	.000
SEP 26	103	END POD	7462.	4.11	18.1	120.	290.	410.	524.	157.	.025	.072
OCT 11	118	PHYS. MAT	7936.	3.23	18.1	129.	324.	454.	534.	180.	.139	.244
OCT 23	130	HARV. MAT	6223.	.21	18.1	136.	336.	472.	534.	190.	.327	.488

RUN NO. 1

UF GA 1978 IRRIGATED

	PREDICTED [1]	MEASURED
FLOWERING DATE	213 [2]	211 [3]
FIRST POD	232	233
FULL POD	239	233
PHYSIOL. MATURITY	284	282
POD YLD (KG/HA)	3948.00	4009.00
SEED YLD (KG/HA)	3088.00	3041.00
SHELLING PERCENTAGE	78.22	75.85
WT. PER SEED (G)	.144	.144
SEED NUMBER (SEED/M2)	2150.00	2223.00
SEEDS/POD	2.05	1.96
MAXIMUM LAI	5.31	4.67
BIOMASS (KG/HA) AT R8	6223.00	6068.00
STALK (KG/HA) AT R8	2198.00	1958.00
HARVEST INDEX	.496	.501

Irrigation Summary
==========

19 IRRIGATION APPLICATIONS @ .75 EFFICIENCY.

CROP AGE	15	64	69	71	74	76	78	80	84	87	90	93	96
AMOUNT,mm	13.	13.	13.	13.	11.	11.	11.	11.	11.	11.	8.	8.	8.

CROP AGE	99	103	106	113	117	128
AMOUNT,mm	8.	7.	8.	7.	8.	10.

SOYBEAN YIELD : 3088.3 KG/HA [46.0 BU/ACRE]

[1] columns 26–34
[2] columns 26–34
[3] columns 39–47

SAMPLE OUT2 FOR SOYBEAN

RUN[4] 1 IRRIGATED[5]

INST_ID: UF SITE_ID: GA EXPT_NO: 01 YEAR: 1978[6] TRT_NO: 1[7]

EXPERIMENT : BRAGG, IRRIGATED & NON-IRRIGATED

TREATMENT : IRRIGATED

WEATHER SET : GAINESVILLE (29.6N,82.4W), FLORIDA 1978

SOIL TYPE : Millhopper Fine Sand (Loamy,silic,hyperth Grcss. Paleudults)

VARIETY : BRAGG MATURITY GROUP : 7

IRRIGATION : ACCORDING TO THE FIELD SCHEDULE

JUL DAY[8]	VST-AGE	LAI	PODS NO	STEM WT	SEED WT	LEAF WT	CANO-WT	POD WT	SHELL WT	ROOT WT	SEED NO	HARVEST IND	SHELL %	SLA	SEED SIZE	NIT %	WATER STRESS	ROOT LENGTH DENSITY L1	L2	L3	L4	L5	L6	L7	L8
166	.00	.00	.0	.0	.0	.0	.0	.0	.0	.0	.0	.000	.0	180.0	.0	4.70	1.00	.05	.05	.03	.00	.00	.00	.00	.00
167	.00	.00	.0	.0	.0	.0	.0	.0	.0	.0	.0	.000	.0	180.0	.0	4.70	1.00	.05	.05	.03	.00	.00	.00	.00	.00
169	.00	.00	.0	.0	.0	.0	.0	.0	.0	.0	.0	.000	.0	180.0	.0	4.70	1.00	.05	.05	.03	.00	.00	.00	.00	.00
171	.00	.00	.0	.0	.0	.0	.0	.0	.0	.0	.0	.000	.0	180.0	.0	4.70	1.00	.05	.05	.03	.00	.00	.00	.00	.00
173	.35	.03	.0	3.6	.0	17.2	20.9	.0	.0	19.0	.0	.000	.0	199.6	.0	4.70	1.00	.05	.05	.03	.00	.00	.00	.00	.00
175	.77	.05	.0	4.6	.0	20.9	25.5	.0	.0	22.5	.0	.000	.0	246.5	.0	4.70	1.00	.05	.07	.04	.00	.00	.00	.00	.00
177	1.19	.07	.0	6.4	.0	27.3	33.7	.0	.0	28.8	.0	.000	.0	274.3	.0	4.70	1.00	.05	.08	.05	.00	.00	.00	.00	.00
179	1.77	.11	.0	9.6	.0	37.4	47.0	.0	.0	38.3	.0	.000	.0	295.6	.0	4.70	1.00	.05	.11	.06	.01	.00	.00	.00	.00
181	2.30	.15	.0	14.8	.0	50.4	65.3	.0	.0	52.9	.0	.000	.0	301.3	.0	4.70	1.00	.05	.15	.08	.02	.00	.00	.00	.00
183	2.83	.20	.0	23.2	.0	67.8	91.0	.0	.0	72.5	.0	.000	.0	301.2	.0	4.70	.89	.05	.20	.11	.04	.01	.00	.00	.00

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↓

etc.

[4] columns 2–4
[5] columns 9–39
[6] columns 49–50
[7] columns 60–63
[8] columns 2–4

SAMPLE OUT3 FOR SOYBEAN

RUN[9] 1 IRRIGATED[10]

INST_ID: UF SITE_ID: GA EXPT_NO: 01 YEAR: 1978[11] TRT_NO: 1[12]

EXPERIMENT : BRAGG, IRRIGATED & NON-IRRIGATED

TREATMENT : IRRIGATED

WEATHER SET : GAINESVILLE (29.6N,82.4W), FLORIDA 1978

SOIL TYPE : Millhopper Fine Sand (Loamy,silic,hyperth Gross. Paleudults)

VARIETY : BRAGG MATURITY GROUP : 7

IRRIGATION : ACCORDING TO THE FIELD SCHEDULE

JUL	DAILY					PERIOD				SOIL WATER CONTENT W/DEPTH					TOTAL			
DAY[13]	EP	ET	EO	SR	PHOTOP	MAX	MIN	RAIN	IRRIG	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	PESW
166	.0	3.5	5.0	19.37	13.89	31.7	23.3	.0	.0	.019	.084	.086	.086	.086	.076	.076	.130	154.9
167	.0	2.2	5.4	21.67	13.89	31.1	19.4	2.0	.0	.018	.083	.086	.086	.086	.076	.076	.130	154.7
169	.0	.2	6.4	25.67	13.90	31.1	18.9	2.0	.0	.018	.080	.086	.086	.086	.076	.076	.130	154.4
171	.0	.1	3.3	13.08	13.90	31.1	22.2	2.0	.0	.018	.078	.086	.086	.086	.076	.076	.130	154.1
173	.1	2.1	4.7	18.67	13.90	30.6	21.1	4.5	.0	.030	.075	.085	.086	.086	.076	.076	.130	154.3
175	.2	.3	5.2	19.97	13.90	33.9	21.7	4.5	.0	.018	.071	.083	.086	.086	.076	.076	.130	153.0
177	.4	.7	6.9	24.96	13.89	35.0	22.8	10.3	.0	.018	.076	.081	.086	.086	.076	.076	.130	153.2
179	.5	.7	6.1	20.77	13.89	36.1	22.8	10.3	.0	.018	.069	.078	.085	.086	.076	.076	.130	151.9
181	.7	7.4	7.4	25.06	13.88	36.1	23.3	10.3	13.0	.019	.086	.078	.084	.086	.076	.076	.130	153.5
183	1.3	1.5	8.0	26.56	13.86	36.7	22.8	10.3	13.0	.018	.072	.072	.082	.085	.076	.076	.130	150.8

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etc.

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[9] columns 2–4

[10] columns 9–39

[11] columns 43–50

[12] columns 60–63

[13] columns 2–4

SAMPLE OUT5 FOR SOYBEAN

```
1-column numbers
1---------------------------------------------------------------------->
1===>  1111111111222222222233333333334444444444555555555556666666
123456789012345678901234567890123456789012345678901234567890123456
---------------------------------------------------------------------->
   FLO MAT TLOSS  NSV  NSR TOnup NIR IRRmm  WSV  WSR  CET CRAIN

SB:  47 118    0.  .00  .00    .0  19  190.  .00  .05  472.  534.


1------------------------------------------------------------------------------------->
                                 1111111111111111111111111111111111111111111111
666777777777788888888889999999999900000000001111111111222222222233333333334444
789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
------------------------------------------------------------------------------------->
 BIOM YIELD PDYLD PLTPOP  NF  N-kg  TITLE

 6.22  3.09  3.95  29.90   0     0. IRRIGATED


1------------------------------------------------------------------------------------->
111111111111111111111111111111111111111111111111111111111111111222222222222222222
444444455555555556666666666677777777778888888888999999999900000000001111111
345678901234567890123456789012345678901234567890123456789012345678901234567890123
------------------------------------------------------------------------------------->
 RUN IN SI YEAR EX TR IR CULTIVAR WEATHER FILE SOIL TYPE    ROWSP M-LAI

   1 UF GA 1978 01  1  2 BRAGG    UFGA0112.W78 Gainesville    .914 5.31


1----------------------------------------
2222222222222222222222222222222222222222222
1111122222222223333333333444444444455555555
5678901234567890123456789012345678901234567890123
----------------------------------------
STEMW SDSZ  SDNO  SDPOD  SH%   HI SIM PLT

 2.20  .14  2150.  2.05  78.  .50 166 166
```

OUTPUT FILES FOR PEANUT

SAMPLE OUT1 FOR PEANUT

INPUT SUMMARY RUN NO. 1 SIMULATION BEGINS : MAY 29

INST_ID: UF SITE_ID: GA EXPT_NO: 01 YEAR: 1986 TRT_NO: 1
EXPERIMENT : RAINFED, FLORUNNER, GOOD DISEASE CONTROL
TREATMENT : GOOD DISEASE CONTROL, RAINFED, E. HARVES
WEATHER SET : GAINESVILLE, FLORIDA 1986
VARIETY : FLORUNNER, std MATURITY GROUP : 2
IRRIGATION : ACCORDING TO THE FIELD SCHEDULE
PLANTING DATE: JUN 2 PLANTS/M2: 12.56 ROW SPACING: .914m PLANT SPACING: .087m

SOIL PROFILE DATA Millhopper Fine Sand (Loamy, silic, hyperth Gross. Paleudults)
SOIL ALBEDO : .18 U: 5.0 SWCON: .50 CURVE NO.: 66.0 PHFAC3: .84

DEPTH-m	LL	DUL	SAT	EXTR	INIT	ROOT	KSAT
.00- .05	.023	.086	.230	.063	.110	1.000	7.400
.05- .15	.023	.086	.230	.063	.110	1.000	7.400
.15- .30	.023	.086	.230	.063	.110	.550	15.800
.30- .45	.023	.086	.230	.063	.110	.320	28.000
.45- .60	.023	.086	.230	.063	.110	.320	28.000
.60- .90	.021	.076	.230	.055	.110	.380	27.600
.90- 1.20	.020	.076	.230	.056	.110	.400	17.500
1.20- 1.50	.027	.130	.230	.103	.110	.300	.300
1.50- 1.80	.070	.258	.360	.188	.170	.200	.100
SUM mm	55.2	213.6	453.0	158.4	216.0		

RUN NO. 1 SIMULATION OUTPUT

UF GA 1986 GOOD DISEASE CONTROL, RAINFED, E. HARVES

DATE	CROP GROWTH AGE	STAGE	BIOMASS KG/HA	LAI	V-STAGE	WATER BALANCE COMPONENTS ES mm	EP mm	ET mm	RAIN mm	IRRIG mm	DROUGHT STRESS PHOTO	TURGOR
JUN 2	0	SOWING	0.	.00	.0	16.	0.	16.	15.	19.	.000	.000
JUN 8	6	EMERGENCE	21.	.03	.2	20.	0.	20.	16.	19.	.000	.000
JUN 11	9	V1 STAGE	34.	.05	1.0	28.	1.	29.	41.	19.	.000	.000
JUN 30	28	FLOWERING	305.	.38	7.2	62.	18.	80.	144.	19.	.002	.074
JUL 10	38	R2 STAGE	956.	1.13	10.7	85.	44.	129.	203.	19.	.000	.024
JUL 17	45	R3 STAGE	1402.	1.50	12.4	87.	69.	156.	204.	19.	.162	.327
JUL 23	51	R4 STAGE	1664.	1.73	13.5	93.	81.	174.	265.	19.	.356	.459
AUG 13	72	R6 STAGE	5275.	4.77	20.1	117.	154.	271.	398.	19.	.000	.000
SEP 2	92	END POD	8143.	5.37	23.1	127.	231.	358.	532.	19.	.000	.000
SEP 25	115	END LEAF	10924.	5.02	24.8	138.	321.	458.	606.	19.	.000	.000
OCT 12	132	PHYS. MAT	11758.	4.77	24.8	143.	378.	521.	679.	19.	.022	.076
OCT 12	132	HARV. MAT	11758.	4.77	24.8	143.	378.	521.	679.	19.	.022	.076

RUN NO. 1

UF GA 1986 GOOD DISEASE CONTROL, RAINFED, E. HARVES

	PREDICTED[14]	MEASURED
FLOWERING DATE	181	181
FIRST FULL SIZE POD	204	210
FIRST FULL SEED	225	238
PHYSIOL. MATURITY	285	294
POD YLD (KG/HA)	5740.00	4983.00
SEED YLD (KG/HA)	4528.00	3843.00
SHELLING PERCENTAGE	78.87	77.12
PERCENT MATURE PODS	91.53	48.50
WT. PER SEED (G)	.550	.607
SEED NUMBER (SEED/M2)	823.00	633.00
SEEDS/POD	1.67	1.55
MAXIMUM LAI	5.42	7.51
BIOMASS (KG/HA) AT R8	11758.00	12512.00
STALK (KG/HA) AT R8	3838.00	5076.00
HARVEST INDEX (PODS)	.488	.398

[15] [16]

Irrigation Summary
==========

1 IRRIGATION APPLICATIONS @ .75 EFFICIENCY.

CROP AGE -4
AMOUNT,mm 19.

PEANUT POD YIELD : 5740.5 KG/HA [5120.9 LBS/ACRE]

[14] columns 26–34
[15] columns 26–34
[16] columns 39–47

SAMPLE OUT2 FOR PEANUT

RUN[17] 1 GOOD DISEASE CONTROL, RAINFED, E. HARVES[18]

INST_ID: UF SITE_ID: GA EXPT_NO: 01 YEAR: 1986[19] TRT_NO: 1[20]

EXPERIMENT : RAINFED, FLORUNNER,GOOD DISEASE CONTROL

TREATMENT : GOOD DISEASE CONTROL, RAINFED, E. HARVES

WEATHER SET : GAINESVILLE, FLORIDA 1986

SOIL TYPE : Millhopper Fine Sand (Loamy,silic,hyperth Gross. Paleudults)

VARIETY : FLORUNNER, std MATURITY : 2

IRRIGATION : ACCORDING TO THE FIELD SCHEDULE

JUL DAY[21]	VST-AGE	LAI	PODS NO	STEM WT	SEED WT	LEAF WT	CANO-WT	POD WT	SHELL WT	ROOT WT	SEED NO	HARVEST IND	SHELL %	SLA	SEED SIZE	NIT %	WATER STRESS	ROOT LENGTH DENSITY L1	L2	L3	L4	L5	L6	L7	L8
153	.00	.00	.0	.0	.0	.0	.0	.0	.0	.0	.0	.000	.0	200.0	.0	4.50	1.00	.04	.04	.02	.00	.00	.00	.00	.00
154	.00	.00	.0	.0	.0	.0	.0	.0	.0	.0	.0	.000	.0	200.0	.0	4.50	1.00	.04	.04	.02	.00	.00	.00	.00	.00
156	.00	.00	.0	.0	.0	.0	.0	.0	.0	.0	.0	.000	.0	200.0	.0	4.50	1.00	.04	.04	.02	.00	.00	.00	.00	.00
158	.00	.00	.0	.0	.0	.0	.0	.0	.0	.0	.0	.000	.0	200.0	.0	4.50	1.00	.04	.04	.02	.00	.00	.00	.00	.00
160	.50	.04	.0	7.5	.0	16.8	24.3	.0	.0	16.8	.0	.000	.0	208.1	.0	4.50	1.00	.04	.04	.02	.00	.00	.00	.00	.00
162	1.04	.05	.0	10.6	.0	23.0	33.6	.0	.0	22.7	.0	.000	.0	223.7	.0	4.50	1.00	.05	.05	.03	.00	.00	.00	.00	.00
164	1.78	.08	.0	15.8	.0	32.5	48.3	.0	.0	31.3	.0	.000	.0	231.1	.0	4.50	1.00	.06	.07	.05	.00	.00	.00	.00	.00
166	2.44	.10	.0	21.4	.0	41.7	63.0	.0	.0	39.3	.0	.000	.0	235.7	.0	4.50	1.00	.08	.09	.06	.01	.00	.00	.00	.00
168	3.13	.12	.0	28.6	.0	52.9	81.5	.0	.0	48.7	.0	.000	.0	234.6	.0	4.50	1.00	.08	.12	.07	.02	.00	.00	.00	.00
170	3.83	.16	.0	36.8	.0	64.5	101.4	.0	.0	58.3	.0	.000	.0	242.3	.0	4.50	1.00	.10	.14	.08	.02	.00	.00	.00	.00

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↓
etc.

[17] columns 2–4
[18] columns 9–39
[19] columns 49–50
[20] columns 60–63
[21] columns 2–4

SAMPLE OUT3 FOR PEANUT

```
RUN[22]        GOOD DISEASE CONTROL, RAINFED, E. HARVES[23]
INST_ID: UF  SITE_ID: GA  EXPT_NO: 01  YEAR: 1986[24]TRT_NO: 1[25]
EXPERIMENT    : RAINFED, FLORUNNER,GOOD DISEASE CONTROL
TREATMENT     : GOOD DISEASE CONTROL, RAINFED, E. HARVES
WEATHER SET   : GAINESVILLE, FLORIDA 1986
SOIL TYPE     : Millhopper Fine Sand (Loamy,silic,hyperth Gross. Paleudults)
VARIETY       : FLORUNNER, std    MATURITY :  2
IRRIGATION    : ACCORDING TO THE FIELD SCHEDULE
```

JUL	——— AVERAGE ———					PERIOD				SOIL WATER CONTENT W/DEPTH					TOTAL			
DAY[26]	EP	ET	EO	SR	HLIGHT	MAX	MIN	RAIN	IRRIG	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	PESW
149	.0	6.6	7.6	27.30	13.73	35.6	18.9	.0	19.0	.029	.156	.122	.116	.113	.100	.105	.134	168.5
150	.0	.7	7.7	26.60	13.74	36.1	20.6	.0	19.0	.019	.119	.104	.101	.099	.088	.090	.132	167.8
152	.0	3.8	7.0	25.80	13.77	35.0	20.0	4.8	19.0	.027	.095	.094	.094	.093	.081	.082	.134	164.9
154	.0	2.1	6.1	23.00	13.79	34.4	20.0	15.0	19.0	.019	.095	.092	.091	.090	.078	.079	.132	160.9
156	.0	.5	5.4	21.00	13.81	32.8	21.1	15.3	19.0	.019	.087	.089	.088	.088	.078	.079	.132	158.9
158	.0	.5	6.9	25.00	13.83	35.0	21.7	15.6	19.0	.019	.084	.089	.088	.088	.078	.079	.132	158.6
160	.2	.3	5.6	20.10	13.85	35.0	22.2	15.6	19.0	.018	.080	.088	.088	.088	.078	.079	.132	158.1
162	.2	3.2	4.2	16.40	13.86	31.7	21.1	41.2	19.0	.030	.119	.113	.108	.102	.082	.080	.134	173.7
164	.1	5.0	5.0	19.70	13.88	32.2	21.7	50.3	19.0	.047	.105	.099	.098	.096	.080	.079	.132	167.4
166	.2	4.4	4.4	17.80	13.89	30.6	20.6	102.1	19.0	.073	.142	.141	.149	.143	.098	.091	.140	206.1

SAMPLE OUT4 FOR PEANUT

There is no OUT4 file for PNUTGRO.

SAMPLE OUT5 FOR PEANUT

```
1-column numbers
1------------------------------------------------------------------>
1===>  1111111111222222222233333333334444444444555555555556666666
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456
-------------------------------------------------------------------->
   FLO MAT TLOSS  NSV  NSR TOnup NIR IRRmm  WSV  WSR  CET CRAIN

PN:  28 132    0.  .00  .00    .0   1   19.  .00  .04  521.  679.


1-------------------------------------------------------------------------->
                                   1111111111111111111111111111111111111111111
666777777777788888888889999999999000000000011111111112222222222333333333344 4
789012345678901234567890123456789012345678901234567890123456789012345678901 2
-------------------------------------------------------------------------->
 BIOM YIELD PDYLD PLTPOP  NF  N-kg  TITLE

11.76  4.53  5.74  12.56   0     0. GOOD DISEASE CONTROL, RAINFED, E. HARVES
```

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[22] columns 2–4
[23] columns 9–39
[24] columns 49–50
[25] columns 60–63
[26] columns 2–4

```
1-------------------------------------------------------------------------->
1111111111111111111111111111111111111111111111111111111111111222222222222222
4444444555555555566666666667777777777888888888899999999990000000000011111
3456789012345678901234567890123456789012345678901234567890123456789012234
-------------------------------------------------------------------------->
 RUN IN SI YEAR EX TR IR CULTIVAR WEATHER FILE SOIL TYPE    ROWSP M-LAI

   1 UF GA 1986 01  1  2 FLORUNNE UFGA0112.W86 Gainesville    .914 5.42


1----------------------------------------
2222222222222222222222222222222222222222222
1111122222222223333333333444444444455555555
5678901234567890123456789012345678901234 5
----------------------------------------
STEMW SDSZ  SDNO  SDPOD  SH%   HI SIM PLT

 3.84  .55   823.  1.67  79.  .49 149 153
```

OUTPUT FILES FOR MAIZE

SAMPLE OUT1 FOR MAIZE

```
RUN   1 OUTPUT SUMMARY
INST_ID :IB  SITE_ID: WA  EXPT_NO: 01  YEAR : 1983  TRT_NO:  1
EXP.    :N X VAR WAPIO, IBSNAT EXP.1983-4
TRT.    :X304C 0 kg N/ha
WEATHER :1983 Waipio,HI
SOIL    :Waipio (Clayey, kaolinitic, isohyperth, Tropeptic Eutrustox)
VARIETY :PIO X 304C
IRRIG.  :ACCORDING TO THE FIELD SCHEDULE.

LATITUDE = 21.00, SOWING DEPTH =  5. CM, PLANT POPULATION =  5.8 PLANTS/SQ METER

GENETIC SPECIFIC CONSTANTS   P1 =320.00  P2 = .52  P5=940.00
G2 =625.00  G3 = 6.000


    SOIL PROFILE DATA [ LOCATION: Waipio, HI   ]
    SOIL ALBEDO=  .14  U=  5.0  SWCON=   .60   RUNOFF CURVE NO.=  60.0
```

DEPTH-CM	LO LIM	UP LIM	SAT SW	EXT SW	IN SW	WR	NO3	NH4
							---mg/kg---	
0.- 5.	.220	.350	.550	.130	.260	1.000	3.6	3.4
5.- 15.	.230	.350	.550	.120	.260	1.000	2.8	2.8
15.- 30.	.240	.350	.550	.110	.300	.800	1.4	1.9
30.- 50.	.250	.370	.480	.120	.370	.400	.7	1.1
50.- 70.	.260	.380	.460	.120	.320	.200	.5	.9
70.- 90.	.250	.380	.460	.130	.290	.050	.5	.5
90.- 110.	.260	.400	.480	.140	.320	.020	.4	.5
T 0.- 110.	27.4	41.1	54.1	13.7	34.4		12.*	15.*

```
 * NOTE: Units are in kg / hectare.

FERTILIZER INPUTS
DAY OF YEAR    KG/HA     DEPTH   SOURCE

333        .00        .00

          THE PROGRAM STARTED ON, 326 DAY OF YEAR
```

DATE	CDTT	PHENOLOGICAL STAGE	BIOM	LAI	NUPTK	N%	CET	RAIN	PESW
30 Nov	0.	SOWING	g/m^2		kg/ha		---mm---		cm
1 Dec	14.	GERMINATION					3.	0.	7.
5 Dec	57.	EMERGENCE					11.	65.	12.
29 Dec	378.	END JUVENILE	42.	.71	9.0	2.16	76.	154.	13.
2 Jan	440.	TASSEL INITIATION	53.	.87	11.8	2.20	89.	161.	12.
14 Feb	1087.	75% SILKING	358.	2.70	31.4	.88	232.	279.	10.
25 Feb	1253.	BEGIN GRAIN FILL	448.	2.48	34.5	1.04	279.	309.	8.
9 Apr	1968.	END GRAIN FILL	657.	1.12	20.8	.64	495.	485.	4.
12 Apr	2019.	PHYSIOLOGICAL MATURITY	657.	1.12	20.8	.64	504.	496.	4.

```
YIELD (KG/HA)=  2565. (BU/ACRE)= 40.8 FINAL GPSM=  841. KERNEL WT.(mg)=257.5
```

ISTAGE	CSD1	CSD2	CNSD1	CNSD2	S T A G E OF G R O W T H
1	.00	.00	.11	.30	EMERG to END JUVENILE PHASE
2	.00	.00	.30	.61	END JUV to TASSEL INITIATION
3	.00	.00	.38	.66	TASSEL INITIATION to SILKING
4	.00	.00	.27	.57	SILKING to BEGIN GRAIN FILL
5	.00	.00	.26	.58	GRAIN FILLING PHASE

* NOTE: In the above table, 0.0 represents minimum stress and 1.0 represents maximum stress for water (CSD) and nitrogen (CNSD), respectively.

DAY OF YR	337	339	341	350	355	357	364	6	9	13	19	20	26	41
AMOUNT mm	43.	22.	18.	8.	11.	6.	6.	6.	6.	5.	5.	5.	19.	9.
DAY OF YR	43	55	59	69	73	75	78	82	84	88				
AMOUNT mm	9.	15.	10.	17.	13.	14.	15.	12.	18.	12.				

IRRIGATION THIS SEASON : 304. mm

	PREDICTED [27]	OBSERVED
SILKING DATE	45 [28]	48 [29]
MATURITY DATE	103	108
GRAIN YIELD (KG/HA)	2565.	2991.
KERNEL WEIGHT (G)	.258	.203
GRAINS PER SQ METRE	841.	1245.
GRAINS PER EAR	145.34	215.00
MAX. LAI	2.70	3.24
BIOMASS (KG/HA)	6574.	7801.
STRAW (KG/HA)	4407.	5274.
GRAIN N%	.98	.91
TOT N UPTAK		

SAMPLE OUT2 FOR MAIZE

RUN [30] 1 X304C 0 kg N/ha [31]

INST_ID :IB SITE_ID: WA EXPT_NO: 01 YEAR : 1983 [32] TRT_NO: 1 [33]

EXP. :N X VAR WAPIO, IBSNAT EXP.1983-4

TRT. :X304C 0 kg N/ha

WEATHER :1983 Waipio,HI

SOIL :Waipio (Clayey, kaolinitic, isohyperth, Tropeptic Eutrustox)

VARIETY :PIO X 304C

IRRIG. :ACCORDING TO THE FIELD SCHEDULE.

DAY [34] OYR	SDTT	BIO g/m2	LN	LAI	ROOT	STEM	GRAIN	LEAF	RTD (cm)	PTF	L1	L3	L5
					|----- Weight in g			----|			|- RLV		--|
345	100.	2.	4	.04	.30	.20	.00	.23	31.	.59	.2	.0	.0
352	184.	9.	6	.17	.77	.20	.00	1.28	49.	.66	.3	.1	.0
359	274.	24.	9	.42	1.97	.20	.00	3.89	68.	.67	.5	.4	.0
1	380.	50.	11	.82	4.04	.20	.00	8.38	91.	.68	.6	.7	.1
8	86.	89.	14	1.31	8.61	.43	.00	14.87	110.	.64	.6	1.4	.3
15	189.	135.	17	1.74	13.16	2.15	.00	21.15	110				

[27] columns 26–34
[28] columns 26–34
[29] columns 39–47
[30] columns 2–4
[31] columns 9–39
[32] columns 50–51
[33] columns 61–64
[34] columns 2–4

SAMPLE OUT3 FOR MAIZE

RUN[35] 1 X304C 0 kg N/ha[36]

INST_ID :IB SITE_ID: WA EXPT_NO: 01 YEAR : 1983[37] TRT_NO: 1[38]

EXP. :N X VAR WAPIO, IBSNAT EXP.1983-4

TRT. :X304C 0 kg N/ha

WEATHER :1983 Waipio,HI

SOIL :Waipio (Clayey, kaolinitic, isohyperth, Tropeptic Eutrustox)

VARIETY :PIO X 304C

IRRIG. :ACCORDING TO THE FIELD SCHEDULE.

* Units are in MJ/square meter.

	---------- AVERAGE ----------						PERIOD	SW CONTENT W/DEPTH				TOTAL	
DAY[39] OYR	EP (mm)	ET (mm)	EO (mm)	SR*	MAX C	MIN C	PREC (mm)	SW1	SW2	SW3	SW4	SW5	PESW (cm)
332	.0	.3	3.8	15.	29.9	17.5	.00	.21	.27	.31	.34	.33	6.8
339	.0	1.7	3.7	15.	30.4	17.5	65.00	.34	.38	.41	.39	.38	12.1
346	.0	2.8	3.7	15.	28.1	17.1	28.00	.26	.35	.36	.37	.39	12.9
353	.2	2.4	2.9	12.	25.9	13.4	18.00	.29	.34	.35	.37	.38	13.0
360	.5	3.0	3.0	13.	27.1	15.9	43.00	.24	.35	.36	.38	.39	14.1
2	1.5	2.9	3.2	13.	29.1	17.8	7.00	.17	.32	.33	.36	.38	12.0
9	1.9	3.0	3.2	14.	28.2	16.5	12.00	.26	.29	.31	.34	.37	11.1
16	1.4	2.6	2.6	11.	27.6	18.4	15.00	.28	.31	.31	.34	.37	10.8
23	2.2	3.4	3.4	15.	29.7	19.0	10.00	.25	.28	.29	.32	.36	9.4
30	2.4	3.8	3.8	16.	28.4	18.7	41.00	.39	.34	.35	.30	.35	10.9
37	1.8	2.7	2.7	12.	26.7	14.9	13.00	.30	.32	.33	.33	.35	10.3
44	3.0	4.3	4.3	18.	29.3	18.6	24.00	.34	.34	.33	.31	.34	9.7
51	2.9	4.3	4.3	19.	28.1	18.6	18.00	.31	.32	.31	.30	.32	8.5
58	3.1	4.4	4.4	19.	29.1	16.8	15.00	.26	.30	.29	.29	.31	6.9
65	2.8	4.2	4.2	18.	29.4	15.6	41.00	.27	.33	.34	.31	.31	8.0
72	3.6	5.3	5.3	22.	31.6	17.6	17.00	.23	.30	.29	.29	.30	6.0
79	2.9	4.6	4.6	19.	30.9	18.2	42.00	.33	.34	.33	.28	.30	7.0
86	3.4	5.4	5.4	22.	30.1	19.6	41.00	.34	.34	.35	.30	.29	7.3
93	3.1	5.2											

[35] columns 2–4
[36] columns 9–39
[37] columns 50–51
[38] columns 61–64
[39] columns 2–4

SAMPLE OUT4 FOR MAIZE

RUN[40] 1 X304C 0 kg N/ha[41]

INST_ID :IB SITE_ID: WA EXPT_NO: 01 YEAR : 1983[42] TRT_NO: 1[43]

EXP. :N X VAR WAPIO, IBSNAT EXP.1983-4

TRT. :X304C 0 kg N/ha

WEATHER :1983 Waipio,HI

SOIL :Waipio (Clayey, kaolinitic, isohyperth, Tropeptic Eutrustox)

VARIETY :PIO X 304C

IRRIG. :ACCORDING TO THE FIELD SCHEDULE.

DAY[44] OYR	TOPS N %	NFAC	VEG N UPTK	GRAIN UPTK	NO3 1	NO3 2	NO3 3	NO3 4	NO3 5	NH4 1	NH4 2	NH4 3
			- kg N/ha -		ug N/g soil							
332	4.40	1.00	.0	.0	5.2	3.9	2.0	1.0	.7	2.5	2.0	1.6
339	4.40	1.00	1.0	.0	1.8	3.8	3.3	1.8	1.0	2.4	2.1	1.7
346	4.36	.99	1.2	.0	2.1	3.8	3.4	2.4	1.4	2.5	2.5	1.9
353	3.29	.75	2.9	.0	2.8	4.0	3.6	2.9	1.6	2.0	2.1	1.8
360	2.84	.60	6.9	.0	1.4	2.1	2.9	3.1	2.1	1.9	1.7	1.6
2	2.24	.44	11.8	.0	1.9	1.4	1.8	2.8	2.1	1.7	1.7	1.3
9	1.94	.58	16.9	.0	2.2	1.3	1.2	2.0	1.8	1.5	1.6	1.2
16	1.66	.50	21.6	.0	1.3	1.2	1.3	1.3	1.4	1.4	1.7	1.2
23	1.32	.35	24.0	.0	1.3	1.2	1.2	1.3	1.3	1.5	1.7	1.2
30	1.11	.24	27.2	.0	.9	1.0	.5	1.3	1.3	1.6	1.8	1.2
37	1.01	.26	29.4	.0	1.1	1.2	.9	1.3	1.3	1.8	1.1	1.3
44	.91	.25	31.3	.0	.8	1.1	1.3	1.2	1.4	1.2	1.6	1.4
51	.97	.37	33.5	.0	1.0	.6	1.0	1.3	1.3	1.3	1.9	1.4
58	1.02	.49	33.2	1.4	1.3	1.1	1.3	1.3	1.3	1.6	1.6	1.3
65	1.01	.43	33.7	4.5	.9	.7	.5	1.1	1.3	1.1	.9	1.4
72	.97	.46	30.8	7.9	1.0	1.0	.9	1.3	1.3	1.5	1.4	1.4
79	.89	.46	28.9	11.2	.8	.4	.6	1.3	1.4	1.2	1.8	1.4
86	.83	.48	26.1	14.7	.7	.9	1.0	1.3	1.3	1.8	1.6	1.4

[40] columns 2–4
[41] columns 9–39
[42] columns 50–51
[43] columns 61–64
[44] columns 2–4

SAMPLE OUT5 FOR MAIZE

```
1-column numbers
1---------------------------------------------------------->
1===>  1111111111222222222233333333334444444444455555
12345678901234567890123456789012345678901234567890123 4
---------------------------------------------------------->
    A-M E-M NLOSS NIT  STRS NUPTK NIRR TOT  WAT STRS
    --DAYS- kgN/h   3    5  kg/h       IRR    1    5
MZ:  32  35    0.  .00  .00    .0   0    0.  .00  .00
MZ:  32  24    0.  .00  .00    .0   0    0.  .00  .00
MZ:  32  58    0.  .00  .00    .0   0    0.  .00  .00
MZ:  32  18    0.  .00  .00    .0   0    0.  .00  .00
MZ:  32  10    0.  .00  .00    .0   0    0.  .00  .00
MZ:  32  35    0.  .00  .00    .0   0    0.  .00  .00
MZ:  32  24    0.  .00  .00    .0   0    0.  .00  .00
MZ:  32  58    0.  .00  .00    .0   0    0.  .00  .00
MZ:  32  18    0.  .00  .00    .0   0    0.  .00  .00
MZ:  32  10    0.  .00  .00    .0   0    0.  .00  .00


1-------------------------------------------------------------------------------->
                                                  1111111111111111111111111111111
555556666666666777777777788888888889999999999900000000001111111111222222222223
567890123456789012345678901234567890123456789012345678901234567890123456789 0
-------------------------------------------------------------------------------->
CET  RAIN BIOMASS YIELD YIELD PLANTS NFT  NRATE  TITLE
-- mm ---  ----- T/ha ------
 81.  220.   .61   .00   .00   5.79   0     0. strat.1
 46.  199.   .04   .00   .00   5.79   0     0. strat.1
117.  163.  2.96   .00   .00   5.79   0     0. strat.1
 32.   41.   .06   .00   .00   5.79   0     0. strat.1
 28.   63.   .02   .00   .00   5.79   0     0. strat.1
 81.  220.   .56   .00   .00   5.79   0     0. strat.2
 46.  199.   .04   .00   .00   5.79   0     0. strat.2
116.  163.  2.81   .00   .00   5.79   0     0. strat.2
 32.   41.   .06   .00   .00   5.79   0     0. strat.2
 28.   63.   .02   .00   .00   5.79   0     0. strat.2


1-----------------------------------------------------------------------------------------
1111111111111111111111111111111111111111111111111111111111111111111111111111222222222222222222
3333333334444444444555555555566666666667777777777888888888899999999990000000000111111
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345
-----------------------------------------------------------------------------------------
            RUN IN SI YEAR EX TR IRR VARIETY    FILE1      SOIL          ROW
                                                                        SPACE
              1 WG WG 1981 01  1  1 CORNL281 WGEN0112.W10               .750
              2 WG WG 1981 01  1  1 CORNL281 WGEN0112.W10               .750
              3 WG WG 1981 01  1  1 CORNL281 WGEN0112.W10               .750
              4 WG WG 1981 01  1  1 CORNL281 WGEN0112.W10               .750
              5 WG WG 1981 01  1  1 CORNL281 WGEN0112.W10               .750
              6 WG WG 1981 01  2  1 PIO 3382 WGEN0112.W10               .750
              7 WG WG 1981 01  2  1 PIO 3382 WGEN0112.W10               .750
              8 WG WG 1981 01  2  1 PIO 3382 WGEN0112.W10               .750
              9 WG WG 1981 01  2  1 PIO 3382 WGEN0112.W10               .750
             10 WG WG 1981 01  2  1 PIO 3382 WGEN0112.W10               .750
```

OUTPUT FILES FOR WHEAT

SAMPLE OUT1 FOR WHEAT

INST_ID :KS SITE_ID: AS EXPT_NO: 01 YEAR : 1981 TRT_NO: 1
EXP. :ASHLAND : WHEAT N X IRRIGATED
TRT. :DRYLAND - 0 KG N/HA
WEATHER :Ashland
SOIL :Haynie (Coarse-silty, mixed,calcareous,mesic Typ Udifluvent)
VARIETY :NEWTON
IRRIG. :NEVER IRRIGATED, RAINFED.

LATITUDE= 39.0, SOWING DEPTH= 6. CM, PLANT POPULATION=162. PLANTS PER SQ METER

GENETIC SPECIFIC CONSTANTS P1V = 6.0 P1D = 2.5 P5 = 3.5
G1 = 3.4 G2 = 2.6 G3 = 1.4

DAY OF YEAR IRRIGATION (MM)

SOIL PROFILE DATA [LOCATION: Manhattan,KS]
SOIL ALBEDO= .14 U= 5.0 SWCON= .60 RUNOFF CURVE NO.= 60.0

DEPTH-CM	LO LIM	UP LIM	SAT SW	EXT SW	IN SW	WR	NO3	NH4
							---mg/kg---	
0.- 15.	.072	.225	.275	.153	.205	1.000	9.8	3.4
15.- 30.	.070	.240	.290	.170	.170	.700	7.3	3.2
30.- 60.	.040	.154	.194	.114	.092	.200	5.1	2.5
60.- 90.	.032	.091	.141	.059	.065	.050	4.7	2.2
90.- 120.	.032	.087	.137	.055	.066	.030	4.3	2.7
120.- 150.	.032	.087	.137	.055	.066	.010	4.3	2.7
150.- 180.	.032	.087	.137	.055	.066	.010	4.3	2.7
T 0.- 180.	7.2	22.2	30.9	15.0	16.3		116.*	60.*

* NOTE: Units are in kg / hectare.

FERTILIZER INPUTS

DAY OF YEAR	KG/HA	DEPTH	SOURCE
289	.00	15.00	

THE PROGRAM STARTED ON DAY 279

DATE	CDTT	PHENOLOGICAL STAGE	BIOM	LAI	NUPTK	N%	CET	RAIN	PESW
16 Oct	0.	SOWING	g/m^2		kg/ha		—mm—	cm	
17 Oct	11.	GERMINATION					14.	21.	10.
29 Oct	105.	EMERGENCE					15.	4.	9.
14 Apr	967.	T SPKLT VE DAYS=50.	146.	1.36	37.2	2.56	204.	316.	9.
5 May	1288.	END VEG BEGIN EAR GROWTH	252.	1.74	49.0	1.95	258.	339.	5.
15 May	1475.	END EAR GR. EARS=1020.	364.	1.64	52.5	1.44	304.	416.	9.
25 May	1667.	BEG GR FILL	511.	1.45	53.5	1.05	345.	466.	10.
21 Jun	2183.	MATURITY	687.	.00	13.2	.32	466.	599.	11.

YIELD (KG/HA)=2777. (BU/ACRE)= 41.4 FINAL GPSM= 6722. KERNEL WT.(mg)= 41.3

ISTAGE	CSD1	CSD2	CNSD1	CNSD2	STAGE OF GROWTH
1	.00	.00	.02	.08	EMERG - TERM SPIKLT
2	.17	.32	.55	.83	END VEG - BEGIN EAR GROWTH
3	.00	.00	.22	.65	BEGIN EAR - END EAR GROWTH
4	.00	.00	.00	.27	END EAR GRTH - BEGIN GRFIL
5	.00	.00	.00	.05	LINEAR GRAIN FILL PHASE

* NOTE: In the above table, 0.0 represents minimum stress and 1.0 represents maximum stress for water (CSD) and nitrogen (CNSD) respectively,

	PREDICTED [45]	OBSERVED [46] [47]
ANTHESIS DATE	138	141
MATURITY DATE	172	174
GRAIN YIELD (KG/HA)	2777.	2317.
KERNEL WEIGHT (MG)	41.3	28.9
GRAINS PER SQ METRE	6722.	8017.
GRAINS PER EAR	6.59	18.00
MAX. LAI	1.74	1.02
BIOMASS (KG/HA)	6874.	5994.
STRAW (KG/HA)	4098.	3677.
GRAIN N%	1.66	1.91
TOT N UPTAKE (KG N/HA)	59.3	59.2
STRAW N UPTAKE	13.2	14.9

SAMPLE OUT2 FOR WHEAT

RUN [48] 1 DRYLAND - 0 KG N/HA [49]

INST_ID :KS SITE_ID: AS EXPT_NO: 01 YEAR : 1981 [50] TRT_NO: 1 [51]

EXP. :ASHLAND : WHEAT N X IRRIGATED

TRT. :DRYLAND - 0 KG N/HA

WEATHER :Ashland

SOIL :Haynie (Coarse-silty, mixed,calcareous,mesic Typ Udifluvent)

VARIETY :NEWTON

IRRIG. :NEVER IRRIGATED, RAINFED.

DAY [52] OYR	SDTT	BIO g/m2	TPSM	LAI	ROOT	STEM	GRAIN	LEAF	RTD (cm)	PTF	L1	L3	L5
					|---- Weight in g ----|						|- RLV -|	
308	85.	2.	162.	.04	.007	.000	.000	.014	30.	.65	.0	.0	.0
315	143.	5.	162.	.07	.012	.000	.000	.029	43.	.58	.1	.0	.0
322	237.	12.	162.	.19	.027	.000	.000	.076	63.	.65	.2	.0	.0
329	285.	16.	176.	.25	.046	.000	.000	.098	74.	.31	.3	.0	.0
336	314.	18.	213.	.28	.063	.000	.000	.112	82.	.08	.4	.1	.0
343	359.	23.	295.	.35	.107	.000	.000	.140	92.	.14	.8	.1	.0
350	371.	23.	330.	.36	.121	.000	.000	.143	95.	.00	.9	.2	.0
357	376.	23.	340.	.10	.121	.000	.000	.144	96.	.00	.9	.2	.0
364	388.	23.	363.	.10	.118	.000	.000	.144	98.	.65	.8	.2	.0
6	394.	23.	379.	.10	.117	.000	.000	.144	101.	.00	.8	.2	.0
13	395.	23.	379.	.10	.110	.000	.000	.138	101.	.00	.7	.1	.0

[45] columns 26–34
[46] columns 26–34
[47] columns 39–47
[48] columns 2–4
[49] columns 9–39
[50] columns 50–51
[51] columns 61–64
[52] columns 2–4

SAMPLE OUT3 FOR WHEAT

RUN[53] 1 DRYLAND - 0 KG N/HA [54]
INST_ID :KS SITE_ID: AS EXPT_NO: 01 YEAR : 1981[55] TRT_NO: 1[56]
EXP. :ASHLAND : WHEAT N X IRRIGATED
TRT. :DRYLAND - 0 KG N/HA
WEATHER :Ashland
SOIL :Haynie (Coarse-silty, mixed,calcareous,mesic Typ Udifluvent)
VARIETY :NEWTON
IRRIG. :NEVER IRRIGATED, RAINFED.

* Units are in MJ/square meter.

DAY[57] OYR	AVERAGE EP (mm)	ET (mm)	EO (mm)	SR*	PERIOD MAX C	MIN C	PREC (mm)	SW CONTENT W/DEPTH SW1	SW2	SW3	SW4	SW5	TOTAL PESW (cm)
285	.0	1.1	1.8	9.1	18.0	8.6	6.3	.19	.16	.10	.07	.07	8.9
292	.0	1.5	1.7	8.4	18.9	9.7	14.2	.19	.18	.10	.07	.07	9.5
299	.0	1.3	2.0	11.2	13.7	3.4	3.8	.16	.16	.11	.07	.07	9.0
306	.0	.6	1.5	6.8	18.7	9.8	71.8	.24	.23	.17	.11	.10	15.7
313	.0	1.4	1.5	8.3	14.7	3.0	43.0	.25	.23	.17	.11	.10	17.1
320	.1	1.7	2.0	10.4	18.4	4.5	.0	.18	.18	.15	.09	.09	13.7
327	.2	.8	1.3	8.0	14.0	.5	.0	.16	.17	.15	.09	.09	13.1
334	.2	.6	.9	5.6	10.1	.2	19.3	.22	.21	.15	.09	.09	14.6
341	.2	1.2	1.2	7.1	11.0	.0	12.7	.19	.19	.16	.09	.09	14.2
348	.1	.5	.5	4.5	4.9	-.9	.5	.19	.19	.15	.09	.09	13.7

SAMPLE OUT4 FOR WHEAT

RUN[58] 1 DRYLAND - 0 KG N/HA [59]
INST_ID :KS SITE_ID: AS EXPT_NO: 01 YEAR : 1981[60] TRT_NO: 1[61]
EXP. :ASHLAND : WHEAT N X IRRIGATED
TRT. :DRYLAND - 0 KG N/HA
WEATHER :Ashland
SOIL :Haynie (Coarse-silty, mixed,calcareous,mesic Typ Udifluvent)
VARIETY :NEWTON
IRRIG. :NEVER IRRIGATED, RAINFED.

DAY OYR[62]	TOPS N %	NFAC	VEG N	GRAIN UPTK	NO3 UPTK	NO3 1	NO3 2	NO3 3	NO3 4	NO3 5	NH4 1	NH4 2	NH4 3
			- kg N/ha -			|——— ug N/g soil ———|						
285	4.50	1.00		.0	.0	17.3	8.8	6.2	5.5	5.4	5.0	2.1	1.7
292	4.50	1.00		.0	.0	22.0	11.4	6.8	5.9	5.8	4.8	1.8	1.4
299	4.50	1.00		.0	.0	26.6	11.1	7.3	6.2	6.1	3.5	1.5	1.2
306	4.03	1.00		.8	.0	11.2	13.6	9.8	7.7	8.1	3.2	1.3	1.1
313	3.72	1.00		1.5	.0	6.0	11.7	8.6	6.2	6.7	2.6	1.3	1.0
320	3.69	1.00		3.3	.0	6.8	10.4	7.5	5.2	5.7	2.2	1.2	1.0
327	3.68	1.00		5.3	.0	7.5	9.9	7.6	5.2	5.7	1.9	1.0	.9
334	3.81	1.00		6.6	.0	6.8	10.6	7.5	5.3	5.8	1.6	.9	.9
341	3.83	1.00		8.6	.0	5.0	8.9	7.0	4.9	5.6	1.4	.8	.8
348	3.87	1.00		9.0	.0	5.3	8.7	7.0	5.0	5.6	1.3	.7	.8

[53] columns 2–4
[54] columns 9–39
[55] columns 50–51
[56] columns 61–64
[57] columns 2–4
[58] columns 2–4
[59] columns 9–39
[60] columns 50–51
[61] columns 61–64
[62] columns 2–4

SAMPLE OUT5 FOR WHEAT

```
1-column numbers
1---------------------------------------------------------->
1===>  1111111111222222222233333333334444444444455555
12345678901234567890123456789012345678901234567890123 4
---------------------------------------------------------->
    A-M E-M NLOSS NIT  STRS NUPTK NIRR TOT  WAT STRS
    --DAYS- kgN/h   3    5  kg/h       IRR    1   5
WH:  77 112    0.  .00  .00    .0   0    0.  .00  .00
WH:  77 106    0.  .00  .00    .0   0    0.  .00  .00
WH:  77  98    0.  .00  .00    .0   0    0.  .00  .00
WH:  77 115    0.  .00  .00    .0   0    0.  .00  .00
WH:  77 104    0.  .00  .00    .0   0    0.  .00  .00
WH:  77 112    0.  .00  .00    .0   0    0.  .00  .00
WH:  77 106    0.  .00  .00    .0   0    0.  .00  .00
WH:  77  98    0.  .00  .00    .0   0    0.  .00  .00
WH:  77 115    0.  .00  .00    .0   0    0.  .00  .00
WH:  77 104    0.  .00  .00    .0   0    0.  .00  .00


1---------------------------------------------------------------------------------->
                                                  1111111111111111111111111111111
555556666666666777777777788888888889999999999000000000011111111112222222223
567890123456789012345678901234567890123456789012345678901234567890123456789 0
---------------------------------------------------------------------------------->
CET  RAIN BIOMASS YIELD YIELD PLANTS NFT  NRATE  TITLE
-- mm ---  ----- T/ha -------
 223.  311.  5.33  2.99  2.99 162.00   0     0. strat.1
 209.  496.  5.14  2.86  2.86 162.00   0     0. strat.1
 239.  275.  7.06  3.43  3.43 162.00   0     0. strat.1
 228.  193.  6.50  3.47  3.47 162.00   0     0. strat.1
 216.  313.  4.22  2.32  2.32 162.00   0     0. strat.1
 223.  311.  5.04  2.06  2.06 162.00   0     0. strat.2
 209.  496.  4.83  2.22  2.22 162.00   0     0. strat.2
 239.  275.  6.70  2.49  2.49 162.00   0     0. strat.2
 228.  193.  6.11  2.55  2.55 162.00   0     0. strat.2
 216.  313.  3.97  1.88  1.88 162.00   0     0. strat.2


1-------------------------------------------------------------------------------------
11111111111111111111111111111111111111111111111111111111111111111111111111222222222222222222
33333333344444444445555555555666666666677777777778888888888999999999900000000001111 1
12345678901234567890123456789012345678901234567890123456789012345678901234567890123 45
-------------------------------------------------------------------------------------
          RUN IN SI YEAR EX TR IRR VARIETY    FILE1      SOIL          ROW
                                                                      SPACE
            1 WG WG 1981 01  1  1 CONDO (D WGEN0112.W10                .000
            2 WG WG 1981 01  1  1 CONDO (D WGEN0112.W10                .000
            3 WG WG 1981 01  1  1 CONDO (D WGEN0112.W10                .000
            4 WG WG 1981 01  1  1 CONDO (D WGEN0112.W10                .000
            5 WG WG 1981 01  1  1 CONDO (D WGEN0112.W10                .000
            6 WG WG 1981 01  2  1 WARD (DU WGEN0112 W10                .000
            7 WG WG 1981 01  2  1 WARD (DU WGEN0112.W10                .000
            8 WG WG 1981 01  2  1 WARD (DU WGEN0112.W10                .000
            9 WG WG 1981 01  2  1 WARD (DU WGEN0112.W10                .000
           10 WG WG 1981 01  2  1 WARD (DU WGEN0112.W10                .000
```

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