III. Appendices

E. Water Appendix

7. Water Exposure Assessment: Standard Procedure for Quality Assurance/ Control in Developing and Documenting Pesticide Root Zone Model (PRZM) Crop Scenarios

a. Overview

The Pesticide Root Zone Model (PRZM) field or orchard crop scenario is the basic file which describes the local or regional climatological information, soil hydrology, soil characteristics, crop characteristics, and the pesticide properties necessary to determine pesticide loadings (flux) to ground or surface water. This file constitutes the "exposure scenario" which is the set of facts, assumptions, and inferences about how exposures may take place that aids the exposure assessor in evaluating, estimating, or quantifying exposures.

Exposure scenarios, such as the PRZM field and orchard crop scenarios, have several general functions in exposure and risk assessments. They are the mathematical tools used to help the assessor estimate exposure and subsequently, dose and risk. They represent the combination of data and information in the PRZM scenario which helps the assessor and the risk manager to understand how the exposure is taking place. Estimates from the exposure scenario are used to develop exposure and risk descriptors for individuals, population or both. Finally, exposure scenarios can help risk managers make estimates of the potential impact of possible control actions by changing assumptions in the exposure scenario.

PRZM exposure scenarios are generally composed to two major components, location (crop specific) and pesticide specific information. The specific location information of the field or orchard scenario is the one component of the exposure scenario that, for the most part, does not change except when advancements in the knowledge about a particular parameter justify such a change. Its primary elements are the climatology, soils and specific crop information, and together, define the field or orchard scenario. The pesticide specific information, unlike the location information, is often changing as application rates, intervals, and numbers change or as uses are added and removed and new information on the pesticide's behavior in the environmental is developed.

Because exposure scenarios for combinations of crops and pesticide use are virtually limitless, managing the variability in one or both of the major components of the scenario provides a means of ensuring consistency in the assessment of pesticide exposures. Pesticide specific information is the most dynamic portions of the scenario, dramatically changing the exposure assessment with the slightest change in one or more parameters. However, with few exceptions, the location information of the field or orchard scenario (climatology, soil, and crop combination) changes very little with time and most changes have little or no effect on the exposure outcome. It is only when one of the three elements of the field or orchard scenario, climatology, soil or crop changes that the field or orchard scenario changes dramatically, however, as defined, the result is almost always a “new” field or orchard scenario.

Field and orchard scenarios are used repeatedly for many different pesticides and tend to be reused by an individual or many exposure assessors. The absence of constant change and the widespread use of field and orchard scenarios, provides an opportunity for “standardization.” Standardization provides consistency in a major component of the PRZM exposure scenario. Procedures to ensure consistency in a PRZM field and orchard scenario during its development or modification for all elements associated with climatology, soil, and crop are provided in this appendix.

As an initial step, existing field and orchard scenarios were reviewed to determine those parameters that were germane to the climatology, soil, and crop. Each parameter was subjected to a defined set of quality control procedures to ensure that data were or would be (for those scenarios yet to be developed) of known or adequate quality, from sources that represent current state of the science, and were equally subjected to rigid quality control procedures by their developer. In many cases, previously generated data were used to fulfill current needs, and were reviewed and/or validated with respect to both quality and extrapolation to the current anticipated use. The review of historical data considered how long ago the data were collected and whether they remain representative.

When existing or historical data were determined to be unrepresentative, of poor and questionable quality, or absent, information sources for each parameter of the field and orchard scenario were identified through a systematic search of available literature, professional contacts, government databases or experts, state and local field experts and through publically accessible electronic media such as the World Wide Web. Data sources were reviewed for completeness, validation, documentation, and age. For most parameters, a hierarchy of sources was provided to facilitate flexibility in selecting parameter values best suited for the particular scenario. In each case, the selection of a parameter required justification and were documented in the scenario Metadata File. Where only one source of information was identified, the description and rationale were clearly provided to avoid compromising the scenario. Data sources and the selection hierarchy were institutionalized in a set of standard operating procedures (SOP) for conducting quality assurance and quality control of PRZM field and orchard scenarios and submitted to EFED’s Water Quality Technical Team for scientific peer review. For some parameters, the document itself became the data source and/or reference for a parameter value.

The purpose of the standard operating procedures (SOP) is to document the set of methods, actions, and steps, under the Agency and EFED's quality system, necessary to facilitate consistency in the quality and integrity of the review and development of each PRZM field and crop scenario. These procedures promote a transparent and consistent process of acceptable, comparable, and defensible operating procedures for developing and reviewing exposure scenarios. The SOP is intended to be used by all staff in EFED and may be used by exposures assessors outside its organization wishing to present assessments to the Agency for review and use. They minimize opportunity for miscommunication, serve as training information, provide a means of reconstructing a scenario, and provide a permanent record of how each scenario was developed and reviewed, long after the authors have left the organization.

Certain parameters of the field and orchard scenario are known to be more sensitive than others and as such has greater impact on pesticide transport to surface or ground water. By examining the individual components of the scenario, scientists and risk managers can focus their efforts on the factors that contribute most to the exposure and risk and use these to select options to reduce exposure. Relying on experience from the use of PRZM, field studies, and model evaluations, a determination was made as to the potential sensitivity of scenario parameters to pesticide runoff from a treated field. Once identified, these parameters were given greater attention during the identification of reliable and certified results for parameter value selection. These parameters were often limited to a few sources of information because standards of reliability and certification needed to be more stringent in an attempt to minimize parameter uncertainty. Remaining, less sensitive, parameters often had more sources of information from which to select a value or provided more flexibility in the tolerance of a value.

Scenarios were developed in such a manner to represent the "high-end" of all sites where a crop could be grown and would be vulnerable to surface runoff within a given geographic region. The selection of site parameters is based on the best professional judgement of the scientist in consultation with experts within and outside of EFED and the Agency and is not merely a random aggregation of parameters to form the scenario. Classically defined, if all the sites in an area where a particular crop could be grown were placed on a distribution according to pesticide runoff, the high-end site would represent a site where 90^{th} percent or more of all sites would have less pesticide runoff. However, this site would be below the site that would yield the highest exposure. Combinations of parameters were avoided that were inconsistent with what might occur in an actual agricultural setting or would introduce a systematic error resulting in a scenario that would likely result in the maximum exposure or theoretically exceed the maximum exposure on a true distribution. In short, the field and orchard scenarios were developed to represent an actual agricultural field within the limits of the model.

Providing oversight to the quality control is the Environmental Fate and Effects Division’s (EFED) quality assurance system. This system provides the policies and administrative requirements that cover the implementation and review of the procedures for the quality control of each field and orchard scenario.

Any discussion of the development or use on an exposure scenario, regardless of its simplicity, cannot exclude a discussion of its uncertainty. Assessing uncertainly may involve simple complex techniques depending on requirements of the assessment. Uncertainty discussions may take the form of a characterization or an assessment, each having a very different level of sophistication. An “uncertainty characterization” is generally the least sophisticated and takes the form of a qualitative discussion of the thought processes that lead to the selection and rejection of specific data or information in the PRZM field and orchard scenario. On the other hand, an “uncertainty assessment” is generally more quantitative and may include simple or complex assessment measures and techniques. Two types of uncertainty are presented here in general terms that are directly related to the PRZM field and orchard scenario, *scenario uncertainty* and *parameter uncertainty*. A third type of uncertainty, *model uncertainty*, is discussed elsewhere.

Scenario uncertainty is associated with missing or incomplete information needed to fully define the exposure. Are all essential and crucial elements of a soil’s characteristics, crops cultural practices or climatological information captured in the scenario which is the foundation of a representative exposure scenario? These are generally defined as descriptive errors. Another source of error, thus uncertainty, is referred to as aggregation errors. The most obvious error of this type is represented by the fact that a large field such as the Index Reservoir watershed is made up of a homogenous soil, whether within a series or across a number of soil series. Others include crop planting, emergence, maturation and harvest dates uniform throughout the watershed, although this factor may have little impact on the overall exposure assessment. Another source of error is in professional judgement. PRZM field and crop scenarios, as well as the SOP developed to “standardize” and ensure the quality of each scenario may suffer from the uncertainty associated with poorly defining a procedure or in the judgement to select one parameter value over another whether permitted by guidance or not. It is safe to say that every exposure assessment suffers from professional judgement error, but it remains a valuable aspect of any assessment for numerous reasons. The SOP, and each scenario derived using the SOP, included a discussion or reference to allow a reader to make an independent judgement about the validity of the scenario.

Parameter uncertainty arises from errors in measurements, sampling, variability, and the use of surrogate or generic data. Most parameters germane to the PRZM field and orchard scenario arise from sources that provide information to describe the errors that may occur in their data, especially measurement and sampling error. Measurement errors may be random (imprecision in the measurement) or systematic (bias or tendency away from the true value), while sampling error arises from making inferences about the representativeness of data for a parameter from a subset of the total population. Sample error may also arise from the use of data for a purpose other than used in the scenario. Variability uncertainty arises in the scenario from climate factors that may vary widely from one season to the next, soil properties that vary spatially across a landscape, even within the same series, or the emergence and harvest dates that vary spatially and temporally across the watershed. Each scenario was developed consciously avoiding the use of surrogate or generic data. However, limits on data for crop factors such as conservation practices and Manning's N values (surface roughness) necessitated the use of surrogate information from similar crops. In most cases, characterizing uncertainty in the parameter is described in the source material using classical methods such as a description of the range or a probabilistic description of the parameter range. If, based on the parameter uncertainty, the assessor needs to know the impact of parameter uncertainty in the overall exposure assessment, a number of methods exist to aid in its determination. These methods include, but are not limited to sensitivity analysis, probabilistic analysis, analytical uncertainty propagation, and the more classical statistical methods.

The procedures that follow are intended for exposure and risk assessors in the Agency and exposure and risk assessment consultants, contractors, or other persons who perform work to be submitted to the Agency for review. In addition, risk managers may also benefit from this document since it clarifies and presents the terminology, procedures, methods, and sources of information used by the Environmental Fate and Effects Division of the Office of Pesticide Programs to develop, document and certify a "standard" PRZM crop scenario.

b. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios

Shaded Records indicate parameters that need to be included in the development and review of Standard PRZM Field and Orchard Scenarios.

Getting Started: <u>New Scenarios</u>. The recommendation of the PRZM Field and Orchard Scenario QA/QC Subgroup is to use the PRZM Input Collator (PIC) running under the PIRANHA 3.0 Shell to "build" a draft crop scenario. PIC will provide the basic cropping information, crop characteristics, field characteristics, and soil characterization information necessary to begin the development of the scenario. Soils information should be checked against data provided in the USDA's National Soils Characterization Database, County Soils Survey, or in consultation with the County or State Soil Scientist. Information and contacts can be found at: http://www.statlab.iastate.edu/soils/nsdaf/ . Crop specific and meteorological information can be certified using the various references outlined in the QA/QC procedures below.

Select the Major Land Resource Area (MLRA) for the crop to be modeled from the Land Resource Regions and Major Land Resource Areas of the United States; http://www.ma.nrcs.usda.gov/mo/momap.htm . Using PIC, select the crop to be modeled and proceed. If the crop does not appear on the list, you will need to select the closest related crop to model and rely on the QA/QC procedures later in this document to ensure crop specific parameters and soil selection are appropriate. Examples of cops that will not be available in PIC are orchard crops and alfalfa. Meadow/Pasture/Hay should be selected for orchards and alfalfa and the QA/QC procedures followed to modify the information for the specific crop to be modeled.

The soil selected should be a benchmark soil that is in hydrologic group "C" or "D". A benchmark soil is one of large extent, one that holds a key position in the soil classification system, one for which there is a large amount of data, or one that has special significance to farming, engineering, forestry, ranching, recreational development, urban development, wetland restoration, or other uses. A listing of benchmark soils can be found at: http://www.statlab.iastate.edu/soils/nssh/630.htm If a benchmark soil is unavailable, select the "C" or "D" soil with the greatest extent within the MLRA, or select a benchmark soil from the available list and search the National Soils Characterization Database for the availability of data for use in creating the soil profile. It is advisable to check the NRCS Official Soils Description Web page, http://www.statlab.iastate.edu/soils/osd/ , to be sure the soil/crop combination is feasible or talk to a county Extension Agent. If a "C" or "D" soil is unavailable, notify a Scenario Team member or bring your request to the Water Quality Technical Team for assistance in selecting a suitable soil.

PIC produces a PRZM Version 1.0 Input File. Records 1 through 9 are essentially the same, therefore, transferring Records from PRZM 1.0 to PRZM 3.12 does not require conversion different than converting from PRZM 2.3 to PRZM 3.12; relocation of the "C" factors from Record 9 in PRZM 2.3 to Record 9C in PRZM 3.12 is the major difference. The soil profile parameters will need modification. The table below provides the parameter location for a PRZM 1.0 Input file and a PRZM 3.12 Input file to be used for guidance in converting. Also, an example PRZM 1.0 ".inp" file (PRZM1EXP.inp) with all parameters to be transferred identified according to PRZM 3.12 nomenclature is provided on the LAN under: F:\USER\SHARE\Models\Aquatic Exposure\PRZMEXAMS\Scenarios\STD_SCEN\QA_QC OP SCENARIOS\General Documentation

In a PRZM 1.0 Input file, the soils information begins after the "Soils Title" on the printout. Record 19 corresponds to this position in a PRZM 3.12 Input file. The tables below begin at these points. If at any time you need help, contact a member of the Scenario Team.

Once the parameters from the PRZM 1.0 file have been transferred to the Excel PRZM Input Spreadsheet, follow the guidance below under QA/QC PROCEDURE to complete, verify and revise the PRZM scenario.

PRZM 1.0 Format: Record Number not apparent on printout. Base conversion starting with the "Soils Title" printed on the Input File

RECORD #	PARAMETERS						
	Soil Title						
Next Record	Total Depth of Soil Core - Remainder of Columns in this Record may be set to "0" or another value. Do not transfer these values. They are set and locked to "0" in the Excel spreadsheet. The location of these values are in the example.						
Next Record	Total Number of Horizons						
Next Record	Horizon Number (HORIZN)	Horizon Thickness (THKNS)	Bulk Density (BD)	Hydrodynamic Solute Dispersion Coefficient (DISP)	Decay Rate in the Soil Horizon	Initial Soil Water Content (THETO)	Soil Drainage Parameter (ADL)
	Field Capacity (THEFC)	Wilting Point (THEWP)	Partition Coefficient (KD)	Organic Carbon (OC)			

PRZM 3.12 Format

RECORD #	PARAMETERS						
19	Soil Label (STITLE)						
20	Total Depth of Soil Core - Remainder of Columns (fields) in Record 20 are set to "0" and will be locked.						
33	Total Number of Horizons (NHORIZ)						
34	Horizon Number (HORIZN)	Horizon Thickness (THKNS)	Bulk Density (BD)	Initial Soil Water Content (THETO)	Soil Drainage Parameter (AD)	Hydrodynamic Solute Dispersion Coefficient (DISP)	Lateral Drainage Paramet er (ADL)
36	Pesticide Specific Decay Rate in Soil Horizon						
37	Compartmen t Thickness (DPN)	Field Capacity (THEFC)	Wilting Point (THEWP)	Organic Carbon (OC)	Partition Coefficient (KD)		

QA/QC PROCEDURES: These general procedures are for the review of an existing or the creation of a new PRZM field or orchard scenario.

PRZM Record #	**PRZM Description**	**Input Value**	**Source**
1	TITLE - Simulation Label	File name and Development Date	QA/QC Workgroup consensus: Use the official 2-letter state ID or state name followed by the crop name, e.g., Florida tomato or FLtomato. Include the creation date or QA/AC date if crop scenario currently exists. All scenarios will be based on the index reservoir (field size and hydraulic length) with the EFED Shell or the modeler modifying the PRZM scenario for the pond. For new crop scenarios, regional or national representative sites should be based on the county with the most acres in production among the counties most vulnerable to surface water contamination. For example, when selecting between Johnston or Pitt Counties in NC for a tobacco scenario, both with equal acreage in production, Pitt County should be used because it lies almost entirely in the coastal plain and the precipitation is greater than Johnston County which lies in the Piedmont. In addition, attention to the “Curve Numbers” and hydrologic grouping for the soils is necessary to ensure the reasonableness of the runoff conditions as a representative 90^{th} percentile exposure site. Newly created scenarios should go through peer review by the WQTT or the current Scenario QA/QC subgroup. Use of Benchmark Soils is required unless a justification is provided. Benchmark soils are located at: http://www.statlab.iastate.edu/soils/nssh/630.htm or on the LAN under F:\USER\SHARE\Models\Aquatic Exposure\PRZMEXAMS\Scenarios\STD_SCEN\QA_QC OP SCENARIOS\General Documentation. The electronic file should be named using the official 2-letter state ID (uppercase) followed by the crop name (lowercase), e.g., Fltomato, for the Excel spreadsheet. After a scenario has undergone QA/QC, the name will have an upper case “C”added. The PRZM input file will be created following QA/QC and named using the state code and the first 5 letters of the crop name followed by a “C”.
2	HTITLE - Hydrology information title	County Name and MLRA	Use the full county name for the crop scenario. The Major Land Resource Areas (MLRA) are from the USDA NRCS. Where counties exist in two or more MLRA, the MLRA that contains the greatest amount of land for the crop/soil combination should be used. All other variations should be justified in the Metadata File. MLRAs may be found at: http://www.nhq.nrcs.usda.gov/land/meta/m2147.html
3	PFAC - Pan evapotranspiration		The PRZM Input Collator (PIC) running under PIRANHA (Burns, 1992) will generate this value. Use the PRZM 3 Manual, Figure 5.1 (Carsel, *et al.*) to verify. Slight deviations are tolerable (1 unit) especially in parts of California because of the poor resolution of Figure 5.1. Accept the PIC value if it is within the tolerance. Otherwise, use the value for the specific region based on the location of the crop scenario. The MLRA may also be used as a guide in selecting the appropriate value.

PRZM Record #	PRZM Description	Input Value	Source
	SFAC - Snow melt factor (cm $^{o}C^{-1}$ day^{-1})		The PRZM Input Collator (PIC) running under PIRANHA (Burns, 1992) will generate this value. Use the PRZM 3 Manual, Table 5.1 (Carsel, *et al.*) to verify. Slight deviations are tolerable, but should be less than the minimum value in the maximum range of values. Accept the PIC value if it is within tolerance. Use the maximum value of the minimum range of values for the specific coverage based on the crop for scenarios developed without PIC or if PIC returns a value in the maximum range category. For row crops use the "open areas" range of values and for orchard crops use the "mixed coniferous/deciduous open areas" range of values. In areas where snowfall is not expected to occur or accumulate and persist for more than a day, a default value of 0.0 is recommended. For further details on this factor visit the National Weather Service River Forecast System (NWSRFS) User's Manual (Anderson, 1978) at: http://www.nws.noaa.gov/oh/hrl/general/indexdoc.htm
	IPEIND - Pan factor flag	Set to "0" in all scenarios	Set the flag to "0" allowing the pan data to be read from the weather file.
	ANETD - Depth to which evaporation is extracted (cm)		The PRZM Input Collator (PIC) running under PIRANHA (Burns, 1992) will generate this value. Use the PRZM Manual Figure 5.2 (Carsel, *et al.*) to verify. Slight deviations are tolerable, especially along boundary zones. Accept the PIC value if the difference between PIC and Figure 5.2 does not exceed 4 units (cm). Otherwise, use the mid-point of the range of values based on location of the crop scenario. If a crop region crosses one or more boundaries, select the mid-point value of lowest range of values.
	INICRP - Initial crop flag	Set to "1" in all scenarios	The simulation date should always occur before the emergence date for row crops. For orchard crop the emergence date may be the bud set, flower set, fruit set, etc date. Therefore, set the value to "1" as well.
	ISCOND - Surface condition of initial crop	Crop specific	If unknown, set to a default of fallow or consult with the Extension Agent in the county of the modeled crop for the dominant practice. Does the plant material get left behind or disced (residue) from a previous crop, cover crop exists (cropping) or all material removed (fallow). Provide details in the scenario Metadata File if discussed with Extension Agent.
	DSN - Weather data (5 values)	Leave blank	Used only if you are reading weather data from sources other than the standard MLRA weather files.
Note (Records 7-9): For new scenarios, the assessor should make every effort to select the soil/crop combination for the County/MLRA using PIC under the PIRANHA shell. PIC will select the appropriate values which can then be verified using the QA/QC process described. If PIC does not contain a suitable soil/crop combination, the scenario must be constructed from the data sources identified in this guidance.			
4 and 5	Not Used. Linked to IPEIND	Omit	
6	ERFLAG - Erosion flag	Always set to 4 (MUSS)	Method by which erosion is calculated. MUSS method is specifically designed for small watersheds of which the pond and reservoir watershed classically fit (Carsel, *et al.*). PIC will not generate this value.

PRZM Recor d #	PRZM Description	Input Value	Source
7	USLEK - Soil erodibility factor	Soil specific	The PRZM Input Collator (PIC) running under PIRANHA (Burns, 1992) will generate this value. Use the following to override or verify the PIC value. Slight deviations are tolerable, but not more than 10 percent. When site specific data are absence, such as the case for nearly all new and existing scenarios, follow this procedure: First: If the soil series name is available in the GLEAMS Manual (USDA, 1990) table for Representative Soils, use the "K" value provided; to verify the "K" value from PIC or if the soil is not available and a scenario is being constructed without the benefit of PIC, use Table 3.1 (page 35) of the FARM Manual (EPA, 1985) to estimate the "K" value. Because the value estimated using Table 3.1 is associated with organic matter (OM) content and there are limited OM categories, if the "K" value from PIC is different by more than 10 percent, bring it to the attention of the Scenario Team or the Water Quality Technical Team for resolution; otherwise accept the PIC value. A copy of this table is available on the LAN (F:\USER\SHARE\Models\Aquatic Exposure\PRZMEXAMS\Scenarios\STD_SCEN\QA_QC OP SCENARIOS\General Documentation) directory converted for the PRZM input organic carbon (OC) content: Use the soil OC content that most closely represents the soil series for the scenario. When sufficient details on the site to be modeled, such as the slope length and percent slop at different points on a convex or concave land surface, this value may be estimated using the USDA/ARS RUSLE Version 1.06 program (USDA, 2001). A copy of this program in the form of a "zip executable" is located on the LAN under: F:\USER\SHARE\Models\Aquatic Exposure\PRZMEXAMS\Scenarios\STD_SCEN\QA_QC OP SCENARIOS\ RUSLE 1.06 Folder or may be obtained at http://msa.ars.usda.gov/ms/oxford/nsl/rusle/

PRZM Record #	PRZM Description	Input Value	Source
	USLELS - Topographic factor	Soil specific	The PRZM Input Collator (PIC) running under PIRANHA (Burns, 1992) will generate this value. Use the procedures below to verify the value. Slight deviations in results are tolerable. **Note: be aware that a number of existing scenarios seem to default to 1.0 for LS.** When site specific data are absence, such as the case for nearly all new and existing scenarios, follow this procedure: First: If the soil series name is available in the GLEAMS Manual (USDA, 1990) table for Representative Soils, use the "LS" value provided; or: if it is not available, use the following equation (Haan and Barfield, 1979): $LS = \left(\frac{\lambda}{72.6}\right)^m \left(\frac{430x^2 + 30x + 0.43}{6.613}\right)$ where: λ is slope length x is θ and θ is slope angle (percent slope/100 = θ) m is a constant according to: Slope $\leq$ 3% m = 0.3 Slope = 4% m = 0.4 Slope $\geq$ 5% m = 0.5 Unless the slope length for the field being modeled is known (not hydraulic length, HL), assume a slope length of 400 feet as a default. Haan and Barfield indicate that slope lengths rarely exceed 400 feet for slopes between 3 and 20 percent, within the recommended slopes for reasonable agricultural activities. For an additional references see: http://www.statlab.iastate.edu/soils/nssh/618.htm If the slope parameter is unknown for the simulated field, set at a default of 6 percent for row crops and 12 percent for orchards and field crops such as hay, alfalfa, wheat, etc. According to soil Capability Classes, slopes greater than those above present substantial challenges to agricultural uses. When sufficient details on the site to be modeled, such as the slope length and percent slop at different points on a convex or concave land surface, this value may be estimated using the USDA/ARS RUSLE Version 1.06 program (USDA, 2001).
	USLEP - Practice factor	Set to 1 for Orchards. Set to 0.5 or 0.6 depending on slope for row crops	The PRZM Input Collator (PIC) running under PIRANHA (Burns, 1992) will generate this value. Use the following to verify the value. Slight deviations in this value are tolerable. Orchards: PRZM 3 Manual, Table 5.6 (Carsel, *et al.*). Row Crops: If contour plowing is not common: set to 1. If contour plowing is common: set to 0.5 if slope is 3 - 8 percent and 0.6 if slope is 1 - 2 or 9 - 12 percent. Verify with local Extension Agent the extent to which contour plowing is used in the region for that crop. Provide details in the scenario Metadata File. For further details on this parameter see: http://www.brc.tamus.edu/epic/appendixes/erosioncontrol.html
	AFIELD - Size of field (ha)	10 ha pond; 172 ha reservoir. Set to 172 ha as a default	Standard farm pond based on, USDA, 1982. Index Reservoir based on Jones, *et al.*, 2000.
	IREG - Location of Hyetograph	Set to region of US	PRZM 3 Manual, Figure 5.12 (Carsel, *et al.*).

PRZM Record #	PRZM Description	Input Value	Source
	SLP - Slope (%)	Soil Specific	Consult the Official Soils Description Database (Http://www.statlab.iastate.edu/soils/osd/) to obtain the range of slopes for the series. Select mid-point if upper range does not exceed 12 percent (upper-end of slopes on which cultivation for most crops is reasonable). For soils with maximum slopes of greater than 12 percent, contact the local Extension Agent to select a reasonable value or set at a maximum of 6 percent for row crops and 12 percent for orchard and field crops such as hay, alfalfa, wheat, etc. Provide details in the scenario Metadata File.
	HL - Hydraulic Length (m)	Pond 356. Reservoir 600	Pond: Radius of a circle around a 1 ha pond (USDA, 1982). Reservoir: Index Reservoir based on Jones, *et al.*, 2000.
8	NDC - Different crops in a simulation	Set to “1"	QA/QC Workgroup consensus: Most scenarios will model only one crop.
9	ICNCN - Crop number of the different crop	Set to “1"	QA/QC Workgroup consensus: Most scenarios will model only one crop.
	CINTCP - Max interception storage of crop (cm)	Crop specific	PRZM 3 Manual (Carsel, *et al.*), Table 5.4 (limited number of crops) or accept the PIC value. For orchard crops, the value should range from 0.25 to 0.30. Verify that PIC is returning a value in this range for an orchard because PIC does not have orchard crops in its database, otherwise change to 0.25. PRZM always meets the canopy storage requirement first. The remaining precipitation is then available for runoff or infiltration. The QA/QC team is currently tracking down the original reference(s) for this parameter for the purpose of expanding the available selection of crops.
	AMXDR - Max rooting depth of crop (cm)	Crop specific	The PRZM Input Collator (PIC) running under PIRANHA (Burns, 1992) will generate this value. Use the following to verify the value. PRZM 3 Manual (Carsel, *et al.*), Table 5.9 and/or verify with Extension Agent in county of modeled crop. Orchard crops are not available under PIC, therefore, another source is necessary such as the Extension Agent or a crop reference; the BEAD library contains numerous references on crop cultivation as does the USDA crop profile web links. Provide details in the scenario Meta File.
	COVMAX - Max aerial canopy coverage (%)	Crop specific	Set to a default of 100 percent for most row crops. Other crops and orchards should be verified with the local Extension Agent or other authoritative source; the BEAD library contains numerous references on crop cultivation as does the USDA crop profile web links. Provide details in the scenario Meta File.
	ICNAH - Surface condition of crop after harvest	Crop specific	Set to residue unless it is known that a cover crop is routinely planted or consult with an Extension Agent in county of modeled crop. Does the plant material get left behind or disced (residue) and cover crop planted (cropping) or all material removed (fallow). Provide details in the scenario Metadata File. Generally, residue results in more pesticide available for runoff.

PRZM Record #	PRZM Description	Input Value	Source
	CN - Curve number for runoff (3 values)	Crop/soil dependent	The PRZM Input Collator (PIC) running under PIRANHA (Burns, 1992) will generate these values. Use the following to verify the values. **Deviation from GLEAMS values is not acceptable.** The CN values is the most sensitive parameter in PRZM. Primary source for information: is GLEAMS (USDA, 1990), Table A-3. Select the values according to the crop and soil hydrologic class. A file for soil series Hydrologic Groups is located on the LAN at: F:\USER\SHARE\Models\Aquatic Exposure\PRZMEXAMS\Scenarios\STD_SCEN\QA_QC OP SCENARIOS\General Documentation as file **Hsg.doc**. For orchard crops, use the three values for Meadows. Although not specific to orchards entirely (not representative of area under the trees), other choices are less appropriate. The sequence is fallow: value 3; cropping: value 1; residue: value 2. The CN values for row crops should begin with the appropriate tillage practice for the crop under fallow: select the second value; the next two values should refer to the crop under cropping conditions: select in sequence the second and third value. Approaches other than the generic example provided must be documented in the Metadata File for the scenario. Additional Curve Number info can be found in: National Engineering Handbook; Chapters 9 (USDA, 1997) at: http://www.wcc.nrcs.usda.gov/water/quality/common/neh630/4content.html This handbook is consistent with the GLEAMS manual, but, lacks the details for agricultural fields over a growing season (3 values for a given Hydrologic Group). **If there are any questions or doubts concerning the selection of the appropriate CN values, consult a member of the Scenario Team.**
	WFMAX - Max dry weight of crop at full canopy (kg/m^2)	Crop Specific	NOT USED.
	HTMAX - Max height of canopy at maturation (cm)	Crop specific	PIC does not provide this value. Consult the Extension Agent in the county of modeled crop or other authoritative source; the BEAD library contains numerous references on crop cultivation as does the USDA crop profile web links.. Provide details in the scenario Metadata File.
9A	CROPNO - Crop Number	Set to "1"	Generally only one crop modeled.
	NUSLEC - Number of USLEC factors (cover management factor)	Determined by the RUSLE values available	Number and specific values for the Dates, "C"and "Manning's N" factors are available form "RUSLE EPA Pesticide Project, USDA/ARS, (USDA, 2000). Select the crop being modeled in the Land Resource Region (LRR) and the appropriate tillage system. Data are available in electronic format on the LAN at: F:\USER\SHARE\Models\Aquatic Exposure\PRZMEXAMS\Scenarios\STD_SCEN\QA_QC OP SCENARIOS\ RUSLE "C" and "N" FACTORS. Select the appropriate crop/region combination code and extract the file from the LAN. **NOTE:** Each line of values must be fed into the Excel spreadsheet one at a time according to the Record number. The first line of the file is Record 9A; the second line is Record 9B; third line Record 9C; and fourth line Record 9D. If an additional set of lines are available (this is likely the case), the fifth set is Record 9B, sixth set Record 9C and seventh set Record 9D. Record 9A does not repeat.
9B	GDUSLEC - Day to start USLEC and Manning's N factor	Crop Specific	Number and specific values for the Dates are available form "RUSLE EPA Pesticide Project, USDA/ARS, (USDA, 2000). Data available in electronic format on the LAN at: F:\USER\SHARE\Models\Aquatic Exposure\PRZMEXAMS\Scenarios\STD_SCEN\QA_QC OP SCENARIOS\RUSLE "C" and "N" FACTORS. Select the appropriate crop/region combination. See **Note** in Record 9A.

PRZM Recor d #	PRZM Description	Input Value	Source
	GMUSLEC - Month to start USLEC and Manning's N factor	Crop Specific	Number and specific values for the Dates are available form "RUSLE EPA Pesticide Project, USDA/ARS, (USDA, 2000). Data available in electronic format on the LAN at: F:\USER\SHARE\Models\Aquatic Exposure\PRZMEXAMS\Scenarios\STD_SCEN\QA_QC OP SCENARIOS\ RUSLE "C" and "N" FACTORS. Select the appropriate crop/region combination. See **Note** in Record 9A.
9C	USLEC - Soil loss cover management factors for fallow, cropping and residue	Crop/soil specific	Number and specific values for the "C" factors are available form "RUSLE EPA Pesticide Project, USDA/ARS, (USDA, 2000). Data available in electronic format on the LAN at: F:\USER\SHARE\Models\Aquatic Exposure\PRZMEXAMS\Scenarios\STD_SCEN\QA_QC OP SCENARIOS\ RUSLE "C" and "N" FACTORS. Select the appropriate crop/region combination. See **Note** in Record 9A.
9D	MNGN - Manning's N	Crop/soil specific	Number and specific values for the "Manning's N" factors are available form "RUSLE EPA Pesticide Project, USDA/ARS, (USDA, 2000). Data available in electronic format on the LAN at: F:\USER\SHARE\Models\Aquatic Exposure\PRZMEXAMS\Scenarios\STD_SCEN\QA_QC OP SCENARIOS\RUSLE "C" and "N" FACTORS. Select the appropriate crop/region combination. See **Note** in Record 9A.
10	NCPDS - Number of cropping periods	Specific to MLRA weather data	PIRANHA Version 3.0 Manual, Appendix B. (Burns, L.A., *et al.,* 1992). Based on MLRA weather file or crop agricultural practices when planting is less than yearly, e.g., sugarcane, if pesticide is applied at planting.
11	EMD/EMM/IYREM - Day, month and year of crop emergence	Crop specific	USDA Crop Profiles my contain the necessary information. http://ipmwww.ncsu.edu/opmppiap/subcrp.htm or http://www.ippc.orst.edu/IPM-NWecoregion/index.cfm or for orchards http://tfpg.cas.psu.edu/ Also, the Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984) may be used. If neither has the necessary information, consult with the local Extension Agent in the county of modeled crop. Provide details in the scenario Metadata File.
	MAD/MAM/IYRMAT - Day, month and year of crop maturation	Crop Specific	USDA Crop Profiles my contain the necessary information. http://ipmwww.ncsu.edu/opmppiap/subcrp.htm http://ipmwww.ncsu.edu/opmppiap/subcrp.htm or http://www.ippc.orst.edu/IPM-NWecoregion/index.cfm or for orchards http://tfpg.cas.psu.edu/ Also, the Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984) may be used. If neither has the necessary information, consult with the local Extension Agent in county of modeled crop. Provide details in the scenario Metadata File.
	HAD/HAM/IYRHAR - Day, month and year of crop harvest	Crop Specific	USDA Crop Profiles my contain the necessary information. http://ipmwww.ncsu.edu/opmppiap/subcrp.htm http://ipmwww.ncsu.edu/opmppiap/subcrp.htm or http://www.ippc.orst.edu/IPM-NWecoregion/index.cfm or for orchards http://tfpg.cas.psu.edu/ Also, the Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984) may be used. If neither has the necessary information, consult with the local Extension Agent in county of modeled crop. Provide details in the scenario Metadata File.
	INCROP - Crop number associated with NDC	Set to "1"	Generally only one crop modeled.
For new scenarios developed using PIC, PIC will set all parameters except the Manning's N value. Verify all values set by PIC using the above QA/QC process. Replace the Dates, "C" and "Manning's N" values according to the above procedure, Record 9A, 9B, 9C and 9D			

PRZM Record #	PRZM Description	Input Value	Source
Records 12-18 are specific to the pesticide being modeled. Follow instructions and guidance under the Source Column. They are noted here to ensure consistency when "running" a scenario.			
12	PTITLE - Label for pesticide title	Application schedule.	Line generally reserved for pesticide application schedule: method (ground aerial, etc), rate in kg/ha, and target application efficiency. Under the EFED Script Shell, this information will be set from the input screen.
13	NAPS - Total number of pesticide applications	Pesticide specific	Pesticide label or other authoritative source.
	NCHEM - number of pesticides in the simulation	Set as appropriate.	Assessment specific.
	FRMFLG - Flag for testing ideal moisture conditions for pesticide applications	Set to "0"	Generally not used.
	DKFLG2 - Flag to allow bi-phasic half-life	Set as appropriate and use record 14	Pesticide specific.
14	DKDAY/DKMNTH/DKNUM - Day, month and number of day after first half-life begins that half-life two begins	Set as appropriate	Pesticide specific.
15	PSTNAM - Pesticide name for output file	Pesticide specific	Record generally contains the pesticide name and basic fate parameters such as the aerobic soil half-life and K_D or Koc. This is a free form record allowing information as desired.
16	APD/APM/IAPYR - Day, month and year of pesticide application	Pesticide specific	Label or other authoritative source such as the local Extension Agent. Provide details in the scenario Metadata File.
	WINDAY - Number of days soil moisture	Used on if FRMFLG is used. Set to "0"	Generally not used.
	CAM - Application method	Pesticide specific	Pesticide Label. CAM 3 is not used.
	DEPI - Depth of pesticide application	Pesticide/crop specific	Pesticide Label or crop specific pest management procedures. Used only for CAM 4,5,6,7,8. See PRZM 3.0 Manual (Carsel, *et al.*) for more details.
	TAPP - Application rate (kg/ha)	Pesticide/crop specific	Pesticide Label or other authoritative source.
	APPEFF - Application efficiency to target	Specific to application method	For the pond scenario see: Input Parameter Guidance, (USEPA, 2001) and for the reservoir: Jones, *et al.*, 2000.
	DRFT - Spray drift fraction to pond or reservoir	Specific to application method	For the pond scenario see: Input Parameter Guidance, (USEPA, 2001) and for the reservoir: Jones, *et al.*, 2000.
17	FILTRA - Filtration parameter	Only if CAM = 3. Set to "0.0"	This method is generally not used
	IPSCND - Condition for deposition of foliar pesticide after harvest	Required for CAM 2,3.	Because CAM 2 is sometimes used, set value to "1". Remaining pesticide will be converted to soil applied. This will provide a conservative assessment.

PRZM Record #	PRZM Description	Input Value	Source
	UPTKF - Plant uptake factor	Set to "0"	Data generally not available. If data are available, use cautiously.
18	PLVKRT - Pesticide Volatilitzation decay from plant foliage ($days^{-1}$)	Pesticide/crop specific	Data from pesticide fate guideline studies and the Input Parameter Guidance, (USEPA, 2001)
	PLDKRT - Pesticide decay rate on plant foliage ($days^{-1}$)	Pesticide/crop specific	Data from pesticide fate guideline studies and the Input Parameter Guidance, (USEPA, 2001)
	FEXTRC - Foliar extraction coefficient for pesticide washoff per cm of rainfall	Pesticide/crop specific. In absence of data, default is 0.5	Data from pesticide fate guideline studies and the Input Parameter Guidance, (USEPA, 2001) or use default.
18A	PTRAN12, 13, 23 - foliar transformation rate from chemical 1 to 2, 1 to 3 and 2 to 3	Pesticide specific	Data from pesticide specific guideline studies
19	STITLE - Label for soil property title	Soil specific	USDA/NRCS Official Soil Series Name, texture and hydrologic grouping are to be provided, e.g., Loring, Silt loam, HYDG: C. http://www.statlab.iastate.edu/soils/osd/
20	CORED - Flag for total depth of soil core (cm)	Set to Soil Core Depth	PIC will set this value using its database (based on STATSGO/Soils 5: http://www.ftw.nrcs.usda.gov/stat_data.html). Use this database for new scenarios, or the NRCS Soils Characterization Database: http://www.statlab.iastate.edu/soils/ssl/ . Another source of information is the County Soils Survey or the State soil scientist. A listing of available soils surveys and soil scientists are available online at http://www.statlab.iastate.edu/soils/nsdaf/. Existing scenarios should have this value verified with one or more of these databases.
The following 9 Flags will be set and locked by the EFED Script Shell or should be set as recommended in the PRZM ".inp" file			
	BDFLAG - Flag for bulk density	Set to "0"	Bulk density is known and entered in Record 34.
	THFLAG - Field capacity	Set to "0"	Water constants are entered in Record 34.
	KDFLAG - Soil/pesticide adsorption coefficient	Set to "0"	K_D is known and set in Record 36.
	HSWTZ - Drainage flag	Set to "0"	Allows free draining rather than restricted drainage.
	MOC - Methods of characteristic	Set to "0"	Parameters not used in current surface water assessments.
	IRFLAG - Irrigation flag	Set to "0"	Parameters not used in current surface water assessments.
	ITFLAG - Soil temperature simulation flag	Set to "0"	Parameters not used in current surface water assessments.
	IDFLAG - Thermal conductivity and heat capacity flag	Set to "0"	Parameters not used in current surface water assessments.
	BIOFLAG - Biodegradation flag	Set to "0"	Parameters not used in current surface water assessments.

PRZM Record #	PRZM Description	Input Value	Source
21-25	Used only if a Flag other than CORED is set to “1" or “2"	Not Used	Not Used.
26	DAIR - Diffusion coefficient in air	Pesticide specific	Set only if all values in Record 26 are set to a value other than “0". Data from studies on Physical Properties.
	HENRYK - Henry’s Law Constant	Pesticide specific	Set only if all values in Record 26 are set to a value other than “0". Data from studies on Physical Properties.
	ENPY - Enthalpy of vaporization	Pesticide specific	Set only if all values in Record 26 are set to a value other than “0". Data from studies on Physical Properties.
27- 32	Used only if a Flag other than CORED is set to “1" or “2"	Not Used	Not Used.
33	NHORIZ - Total number of horizons	Soil specific, but minimum 3	PIC will set this value. Verify using the USDA/NRCS Official Soil Description or other source identified under Record 20. Be sure there is a minimum of 3 horizon and a reasonable number of maximum. First compartment should be thin. Set to a maximum of 10 cm. The top horizon may be divided in two, the first section having a maximum thickness of 10 cm and the second the balance of the remaining thickness. Both horizons will have identical properties. The purpose of this is to allow small compartments within the horizon without exceeding the programs maximum permissible. See Record 37 for the compartment parameter. http://www.statlab.iastate.edu/soils/osd/
34	HORIZN - Horizon number	Soil specific	Begin with number “1"
	THKNS - Horizon thickness (cm)	Horizon “1"	Soil Series specific. PIC will set this value using its database (based on STATSGO/Soils 5: http://www.ftw.nrcs.usda.gov/stat_data.html). Use this database for new scenarios or the NRCS Soils Characterization Database: http://www.statlab.iastate.edu/soils/ssl/ . Existing scenarios should have this value verified with one or more of these databases or those identified in Record 20.
	BD - Bulk density		Soil Series specific. PIC will set this value using its database (based on STATSGO/Soils 5: http://www.ftw.nrcs.usda.gov/stat_data.html). Use this database for new scenarios or the NRCS Soils Characterization Database: http://www.statlab.iastate.edu/soils/ssl/ . Existing scenarios should have this value verified with one or more of these databases or those identified in Record 20..
	THETO - Initial soil water content (cm^3 cm^{-3})		Soil series specific. PIC will set this value using its database (based on STATSGO/Soils 5: http://www.ftw.nrcs.usda.gov/stat_data.html). Use this database for new scenarios, or the NRCS Soils Characterization Database: http://www.statlab.iastate.edu/soils/ssl/ . Existing scenarios should have this value verified with one or more of these databases or those identified in Record 20..
	AD - Soil drainage parameter	Set to “0"	HSWZT set to “0"
	DISP - Pesticide hydrodynamic solute dispersion coefficient	Set to “0"	Not used is surface water modeling
	ADL - Lateral soil drainage parameter	Set to “0"	HSWZT set to “0" and not used in surface water modeling.

PRZM Record #	PRZM Description	Input Value	Source
35	Not used - BIOFLAG set to "0"		
36	DWRATE/DSRATE/DGRATE - Dissolved, adsorbed, and vapor phase pesticide decay rates. (Day^{-1})	Pesticide specific	Laboratory Studies. Aerobic Soil Metabolism Studies. See Input Parameter Guidance.
37	DPN - Thickness of compartments with the horizon (cm)	Horizon "1"set to 0.1. Lower horizons can be 1 - 10	QA/QC Workgroup consensus: The horizon thickness will be divided into compartments of specified thickness. Fractional compartments are not permitted. The first compartment is to be divided into 0.1 cm segments. Remaining compartments should be either 1.0, 2.0 or 5.0 cm.
	THEFC - Field capacity in the horizon (cm^3 cm^{-3})	Soil specific	PIC will set this value using its database (based on STATSGO/Soils 5: http://www.ftw.nrcs.usda.gov/stat_data.html). Use this database for new scenarios, or the NRCS Soils Characterization Database: http://www.statlab.iastate.edu/soils/ssl/ . Existing scenarios should have this value verified with one or more of these databases or those identified in Record 20..
	THEWP - Wilting point (cm^3 cm^{-3})	Soil specific	PIC will set this value using its database (based on STATSGO/Soils 5: http://www.ftw.nrcs.usda.gov/stat_data.html). Use this database for new scenarios, or the NRCS Soils Characterization Database: http://www.statlab.iastate.edu/soils/ssl/ . Existing scenarios should have this value verified with one or more of these databases or those identified in Record 20..
	OC - Organic carbon (%)	Soil specific	PIC will set this value using its database (based on STATSGO/Soils 5: http://www.ftw.nrcs.usda.gov/stat_data.html). Use this database for new scenarios, or the NRCS Soils Characterization Database: http://www.statlab.iastate.edu/soils/ssl/ . Existing scenarios should have this value verified with one or more of these databases or those identified in Record 20..
	KD - Partition coefficient (cm^{-3} g^{-1})	Pesticide specific	Laboratory Studies. Batch Equilibrium studies. See Input Parameter Guidance (USEPA, 2001).
Repeat Records 33, 34, 36, 37 for each horizon in the soil profile			
38 - 39	Not used	Not used	
40	ILP - Flag for initial pesticide level	Set to "0"	Do not assume prior pesticide applications.
	CFLAG - Conversion flag for initial pesticide levels	Set to "0"	Do not assume prior pesticide applications.
41	Not used.	Not used - related to Record 40	

PRZM Record #	PRZM Description	Input Value	Source
42 - 46	**These Records are set to defaults which control the time steps and outputs. All newly created scenarios will have these parameters set by the EPA Shell (Kennedy, I., 2001). The structure follows:** YEAR 10 YEAR 10 YEAR 10 1 1 1 ----- 7 YEAR PRCP TSER 0 0 RUNF TSER 0 0 INFL TSER 1 1 ESLS TSER 0 0 1.0E3 RFLX TSER 0 0 1.0E5 EFLX TSER 0 0 1.0E5 RZFX TSER 0 0 1.0E5		

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c. Water Exposure Assessment: Documentation of Pesticide Root Zone Model (PRZM) Field and Orchard Crop Scenarios

A fundamental construct for using data in any number of electronic environments, whether they are databases, models, or the World Wide Web, is to have an understanding of the data or information that make up its essential parts. Metadata is literally the "data about data." Metadata is the information used by a variety of groups to design, create, describe, preserve, and use information resources and systems. The crucial, non pesticide specific elements of each Pesticide Root Zone Model (PRZM) field and orchard scenario is recorded as a means of preserving an authoritative and reproducible record of the design, construct, and source of each element of the scenario.

In general, the information assembled to created each scenario will have three basic features: content, context, and structure; all of which are reflected through metadata. The data content relates to what each scenario contains or is about and is intrinsic to the field or orchard being modeled. Content reflects the element by which the designer authenticates and completes the content of the field or orchard scenario. For example, content is the date of a crop's maturation, the organic content of a particular soil, or the rate at which snow melts in the location of the scenario. Contexts are those aspects associated with the scenario's creation, such as the how or from where the soil characteristics were selected, where the weather station is located, or what cropping practices were chosen and why. The structure relates to the associations within and among the individual parameters that make up the scenario. An example of the structure would be the relationship of the depth of the total soil profile to the individual soil horizons. All three aspects of metadata are essential components of a scenario and have been captured and described in following pages.

In short, in an environment where immediate access to underlying information used to govern the construct of a PRZM field or orchard scenario, metadata:

- ❑ certifies the authenticity and degree of completeness of the scenario's content;
- ❑ establishes and documents the context of the scenario's content;
- ❑ identifies the structural relationships that exist between and within a parameter of the scenario;
- ❑ provides an access point for a diverse range of users of the

scenario; and

- ❑ assembles electronically the information the developer might have ordinarily provided in a physical reference.

The following descriptions of each PRZM field and orchard scenario used in the assessment of drinking water exposures derived from surface water sources reflect the basic principles of establishing administrative and descriptive “metadata.” However, it remains vitally important to understand that metadata is the “data about the data” and acting as umbrellas to this information are the established Agency procedures for ensuring the quality of that information. This is accomplished through the basic tenants of Quality Assurance and Quality Control in the selection of parameters that constitutes the field and orchard scenario.

CALIFORNIA ALFALFA (Northern and Southern)

The field used to represent alfalfa production in California is located in San Joaquin County in the Central Valley, although the crop is grown throughout the Central Valley and as far south as the Imperial Valley. According to the 1997 Census of Agriculture, California is ranked 1st in pounds of alfalfa hay harvested and among the top 10 in acres planted. Alfalfa is a perennial crop, planted early in the year and maintained under continuous cultivation on a 4- to 5-year cycle at which time a new crop is planted. Planting depths range from 0.25 to 1.0 inches, depending on soil texture, on level seed beds. Row spacing is approximately 30 inches; nearly all alfalfa is irrigated in California by flooding. Cuttings range from 3 to 5 per year under most conditions. Alfalfa prefers well-drained soil with a pH near neutral. Root systems rarely exceed 2 feet in California and cuttings occur when the plant reaches a height of approximately 30 inches. The soil selected to simulate the field is a benchmark soil, Sacramento clay. Sacramento clay, is a very-fine, smectitic, thermic Cumulic Vertic Endoaquolls. These soils are often used for alfalfa cultivation providing the water table is low. Sacramento clay is a poorly to very poorly drained, slowly permeable soil with very slow to slow runoff. These soils formed in fine textured alluvium of mixed origin and are of moderate extent. They are generally found in level basins at elevations near sea level to 60 feet. The soil is typical of soils used for a variety of row crops, rice, safflower and alfalfa. Sacramento clay is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for San Joaquin County, California - Alfalfa

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Southern: Bakersfield, CA (W23155) and Northern: Sacramento, CA (W23232)
Ending Date	December 31, 1983	Meteorological File - Southern: Bakersfield, CA (W23155) and Northern: Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.73	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.45 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	15.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for San Joaquin County, California - Alfalfa		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.20 tons EI^{-1*}	NRI - Average value listed for the soil series Sacramento
USLE LS Factor (USLELS)	0.19	NRI - Average value listed for the soil series Sacramento
USLE P Factor (USLEP)	1.00	NRI - Average value listed for the soil series Sacramento
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	2%	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	2 (cropping period only)	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Irrigation Type (IRTYP)	1 (Flood)	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Leaching Factor (FLEACH)	0.1	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	0.55	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Maximum Rate at which Irrigation is Applied (RATEAP)	0.4 cm hr^{-1}	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for San Joaquin County, California - Alfalfa		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA. 2001)
Initial Surface Condition (ISCOND)	1	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Bakersfield, CA (W23155) or Sacramento, CA (W23232)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for grass (EPA, 2001)
Maximum Active Root Depth (AMXDR)	60 cm	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Maximum Canopy Coverage (COVMAX)	100	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Soil Surface Condition After Harvest (ICNAH)	1	Marcia Campbell-Matthews; San Joaquin County Cooperative Extension Agent. 209-468-2085
Date of Crop Emergence (EMD, EMM, IYREM)	10/01	Value set to approximate planting cycle. Alfalfa is planted one every five years with multiple cuttings in every year
Date of Crop Maturity (MAD, MAM, IYRMAT)	28/12	Value set to approximate planting cycle. Alfalfa is planted one every five years with multiple cuttings in every year
Date of Crop Harvest (HAD, HAM, IYRHAR)	31/12	Value set to approximate planting cycle. Alfalfa is planted one every five years with multiple cuttings in every year
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	90, 88, 89	Gleams Manual Table A.3, Pasture/Range, Non-CNT, Poor (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project, A01OCOCM; Orchard, cover alley, Mulch till, Olympia, WA (USDA, 2000)
USLE C Factor (USLEC)	0.046 - 0.221	RUSLE Project; A01OCOCM; Orchard, cover alley, Mulch till, Olympia, WA. Variable with date (USDA, 2000)

Table 4. PRZM 3.12 Sacramento Soil Parameters for San Joaquin County, California - Alfalfa		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	176 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (Top horizon split in two)	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 157 cm (HORIZN = 3) 1 cm (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.43 g $\cdot cm^{-3}$ (HORIZN = 1, 2) 1.29 g $\cdot cm^{-3}$ (HORIZN = 3) 1.48 g $\cdot cm^{-3}$ (HORIZN = 4)	
Initial Water Content (THETO)	0.42 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1, 2) 0.44 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.39 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 4.0 cm (HORIZN = 2) 15.7 cm (HORIZN = 3) 1 cm (HORIZN = 4)	
Field Capacity (THEFC)	0.44 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1, 2) 0.42 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.39 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.36 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2,3) 0.3 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	1.77% (HORIZN = 1,2) 0.84% (HORIZN = 3,4)	

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U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

CALIFORNIA CITRUS (Southern)

The field used to represent citrus production in California is located in Fresno County in the Central Valley, although citrus production areas are quite extensive (San Joaquin, Coastal-Intermediate Region, Imperial Valley, Coachella Valley, and the Southern Interior Region). According to the 1997 Census of Agriculture, California is the major producer of citrus (lemons and oranges) for the fresh market, and among the highest producers in other citrus (grapefruit, tangerines, tangelos, and mandarins). Citrus is generally grown on the foothills to avoid frost damage. Areas under and between rows of trees are generally non-cultivated/non-maintained. Row spacing is approximately 22 feet and between tree spacing is approximately 18 feet. Row canopies tend to be 100 percent, while the canopy between rows is less to permit the operation of maintenance and harvest equipment. Irrigation is mostly by low-volume drip or micro-sprinkler systems, although furrow and overhead sprinklers are also used. The soil selected to simulate the field is a benchmark soil, Exeter loam. Exeter loam, is a fine-loamy, mixed, superactive, thermic Typic Durixeralfs. These soils are often used for citrus production under irrigation. Exeter loam is a moderately deep, moderately well drained, very slow to medium runoff soil that formed in alluvium mainly from granite sources. The soil also consists of a duripan. The Exeter loam has moderately slow permeability above the duripan and very slow permeability within the duripan. These soil are generally found on alluvial fans and stream terraces at elevations of up to 700 feet above mean sea level and have slopes of 0 to 9 percent. The soil is extensive in MLRA 17. Exeter loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Fresno County, California - Citrus

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Southern: Bakersfield, CA (W23155)
Ending Date	December 31, 1983	Meteorological File - Southern: Bakersfield, CA (W23155)
Pan Evaporation Factor (PFAC)	0.7	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.55 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Fresno County, California - Citrus		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI^{-1*}	NRI - Average value listed for the soil series Exeter
USLE LS Factor (USLELS)	0.21	NRI - Average value listed for the soil series Exeter
USLE P Factor (USLEP)	1.0	NRI - Average value listed for the soil series Exeter
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	5%	Mark Freeman, Fresno County Cooperative Extension Agent.
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	2 (cropping period only)	Mark Freeman, Fresno County Cooperative Extension Agent.
Irrigation Type (IRTYP)	1 (Flood)	Mark Freeman, Fresno County Cooperative Extension Agent.
Leaching Factor (FLEACH)	0.1	Estimated
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	0.55	Mark Freeman, Fresno County Cooperative Extension Agent.
Maximum Rate at which Irrigation is Applied (RATEAP)	0.4 cm hr^{-1}	PRZM Manual, Table 5.33 (EPA, 1998)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Fresno County, California - Citrus		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	3	Mark Freeman, Fresno County Cooperative Extension Agent.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Bakersfield, CA (W23155)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for grass (EPA, 2001)
Maximum Active Root Depth (AMXDR)	60 cm	Mark Freeman, Fresno County Cooperative Extension Agent.
Maximum Canopy Coverage (COVMAX)	80	Mark Freeman, Fresno County Cooperative Extension Agent.
Soil Surface Condition After Harvest (ICNAH)	3	Mark Freeman, Fresno County Cooperative Extension Agent.
Date of Crop Emergence (EMD, EMM, IYREM)	02/01	Value set to a default evergreen cycle with no specific crop growth milestone such as flowering of fruit set.
Date of Crop Maturity (MAD, MAM, IYRMAT)	03/01	Value set to a default evergreen cycle with no specific crop growth milestone such as flowering of fruit set.
Date of Crop Harvest (HAD, HAM, IYRHAR)	31/12	Value set to a default evergreen cycle with no specific crop growth milestone such as flowering of fruit set.
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3, Meadows, no fallow conditions (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project; D26CCCCM for cover alley citrus (USDA, 2000)
USLE C Factor (USLEC)	0.096 - 0.150	RUSLE Project; Variable with date, D26CCCCM for cover alley citrus (USDA, 2000)

Table 4. PRZM 3.12 Exeter Soil Parameters for Fresno County, California - Citrus

Parameter	Value	Verification Source
Total Soil Depth (CORED)	183 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	2 (Base horizons)	
First and Second Soil Horizons (HORIZN = 1,2)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 173 cm (HORIZN = 2)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.59 g $\cdot cm^{-3}$ (HORIZN = 1) 1.76 g $\cdot cm^{-3}$ (HORIZN = 2)	
Initial Water Content (THETO)	0.16 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1) 0.2 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =2)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 17.3 cm (HORIZN = 2)	
Field Capacity (THEFC)	0.16 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.2 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2)	
Wilting Point (THEWP)	0.06 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.11 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2)	
Organic Carbon Content (OC)	0.46% (HORIZN = 1) 0.19% (HORIZN = 2)	

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CALIFORNIA CORN (Northern)

The field used to represent corn production in California is located in Stanislaus/San Joaquin Counties in the Central Valley, although the crop is grown in other areas of the state. According to the 1997 Census of Agriculture, California is not among the top twenty corn producing states in the U.S. The crop is generally planted the early Spring (April) and harvested from July thru August. Continuous corn is practice is much of the region, however, rotation with other crops does occur. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. The crop is rarely grown under irrigation. The soil selected to simulate the field is a Madera loam. Madera loam is a, fine, smectitic, thermic Abruptic Durixeralfs. These soils are often used for dry farmed grains as well as for irrigated cropland such as alfalfa, almonds, grapes, oranges, rice and tomatoes. Madera loam is a well to moderately well drained, very slowly permeable, medium to very slow runoff soil formed in old alluvium derived from granite rock sources. They are on undulating low terraces with slopes of 0 to 9 percent. They are generally found at elevations of less than 250 feet above sea level and are known for the formation of vernal pools during the winter months. The soils are extensive in MLRA 17. Madera loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for San Joaquin County, California - Corn

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Northern: Sacramento, CA (W23232)
Ending Date	December 31, 1983	Meteorological File - Northern: Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.73	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.45 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	15.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for San Joaquin County, California - Corn		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.34 tons EI^{-1*}	PRZM Input Collator (Burns, 1992) and FARM Manual (EPA. 1985)
USLE LS Factor (USLELS)	0.79	Haan and Barfield, 1979
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	4.5%	Mid-point of slope range for soils series Madera (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for San Joaquin County, California - Corn		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	PRZM Input Collator (Burns, 1992)
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Sacramento, CA (W23232)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for grass (EPA, 2001)
Maximum Active Root Depth (AMXDR)	90 cm	PRZM Input Collator (Burns, 1992)
Maximum Canopy Coverage (COVMAX)	100	PRZM Input Collator (Burns, 1992)
Soil Surface Condition After Harvest (ICNAH)	3	PRZM Input Collator (Burns, 1992)
Date of Crop Emergence (EMD, EMM, IYREM)	08/04	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	27/07	Based on 110 day maturation for CA Field Corn; http://www.ipm.ucdavis.edu/PMG/crops-agriculture.html
Date of Crop Harvest (HAD, HAM, IYRHAR)	08/09	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	89, 86, 87	Gleams Manual Table A.3, Fallow = Fallow SR/CT, poor condition; Cropping and Residue = Row Crop SR/CT/Poor (USDA, 1990)
Manning's N Value (MNGN)	0.023	RUSLE Project, C21CGBDC- Sacramento corn conventional tillage (USDA, 2000)
USLE C Factor (USLEC)	0.018 - 0.611	RUSLE Project; C21CGBDC- Sacramento corn conventional tillage. Variable with date (USDA, 2000)

Table 4. PRZM 3.12 Madera Soil Parameters for San Joaquin County, California - Corn		
Parameter	Value	Verification Source

Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (Top horizon split in two)	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 12 cm (HORIZN = 2) 30 cm (HORIZN = 3) 48 cm (HORIZN = 4)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.55 g $\cdot cm^{-3}$ (HORIZN = 1, 2, 3) 1.6 g $\cdot cm^{-3}$ (HORIZN = 4)	
Initial Water Content (THETO)	0.223 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1, 2) 0.226 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.163 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 4.0 cm (HORIZN = 2) 5 cm (HORIZN = 3) 6 cm (HORIZN = 4)	
Field Capacity (THEFC)	0.223 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1, 2) 0.226 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.163 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.083 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.186 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.073 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	0.58% (HORIZN = 1,2) 0.29% (HORIZN = 3) 0.174% (HORIZN = 4)	

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

CALIFORNIA COTTON (Southern)

The field used to represent cotton production in California is located in Fresno County in the Central Valley, although cotton production occurs throughout the Central Valley. According to the 1997 Census of Agriculture, California is the major producer of cotton in the U.S. Cotton is generally grown on the alluvial fans and basin rims by both dry and wet seeded methods. Row spacing and planting depths are consistent with other cotton growing regions of the U.S. Both standard (30-inch) and ultra-narrow (20-inch) row spacing are used. Irrigation is mostly by flooding. The soil selected to simulate the field is a Twisselman clay. Twisselman clay is a fine, mixed, calcareous, thermic Typic Torriorthents. These soils are often used for cotton production under irrigation. Twisselman clay is a deep, well drained, slow to medium runoff, slowly permeable (very slow in saline-alkali phases) soil that formed in alluvium mainly from sedimentary rock sources. These soil are generally found on alluvial fans and basin rims at elevations of 200 to 1,000 feet above mean sea level and have slopes of 0 to 5 percent. The soil is of moderate extent. Twisselman clay is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Fresno County, California - Cotton

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Southern: Bakersfield, CA (W23155)
Ending Date	December 31, 1983	Meteorological File - Southern: Bakersfield, CA (W23155)

Pan Evaporation Factor (PFAC)	0.7	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.5 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Fresno County, California - Cotton

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.21 tons EI^{-1*}	PRZM Input Collator (Burns, 1992) and FARM Manual (EPA, 1985)
USLE LS Factor (USLELS)	0.02	Haan and Barfield, 1979
USLE P Factor (USLEP)	1.0	PRZM Manual (EPA,1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	2.5%	Mid-point of soil series range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	2 (cropping period only)	Based on recommendations from farm advisors for general flooding for crop irrigation
Irrigation Type (IRTYP)	1 (Flood)	Based on recommendations from farm advisors for general flooding for crop irrigation
Leaching Factor (FLEACH)	0.1	Estimated
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	0.55	Based on recommendations from farm advisors for general flooding for crop irrigation
Maximum Rate at which Irrigation is Applied (RATEAP)	0.4 cm hr^{-1}	PRZM Manual, Table 5.33 (EPA, 1998)

* EI = 100 ft-tons * in/ acre*hr

Table 3. PRZM 3.12 Crop Parameters for Fresno County, California - Cotton		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Kerry Arroues USDA-NRCS
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Bakersfield, CA (W23155)
Maximum rainfall interception storage of crop (CINTCP)	0.2	PIC; confirmed using Table 5.4 from PRZM Manual (Burns, 1992 and EPA, 1985)
Maximum Active Root Depth (AMXDR)	65 cm	Kerry Arroues USDA-NRCS
Maximum Canopy Coverage (COVMAX)	100	Kerry Arroues USDA-NRCS
Soil Surface Condition After Harvest (ICNAH)	3	Kerry Arroues USDA-NRCS
Date of Crop Emergence (EMD, EMM, IYREM)	05/05	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	03/01	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Date of Crop Harvest (HAD, HAM, IYRHAR)	11/11	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	89, 86, 87	Set to MS Cotton values. Field validated curve numbers.
Manning’s N Value (MNGN)	0.023	RUSLE Project; C23CTCTC; Cotton, conventional tillage, Fresno (USDA, 2000)
USLE C Factor (USLEC)	0.54 - 0.412	RUSLE Project; C23CTCTC; Cotton, conventional tillage, Fresno, Variable with date (USDA, 2000)

Table 4. PRZM 3.12 Twisselman Soil Parameters for Fresno County, California - Cotton		
Parameter	Value	Verification Source

Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 26 cm (HORIZN = 2) 64 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/) Ed Russell (USDA-NRCS, Fresno)
Bulk Density (BD)	1.45 g ·cm^{-3} (HORIZN = 1) 1.5 g ·cm^{-3} (HORIZN = 2) 1.6 g ·cm^{-3} (HORIZN = 3)	
Initial Water Content (THETO)	0.36 cm^3-H_2O ·cm^3-soil (HORIZN =1,2) 0.317 cm^3-H_2O ·cm^3-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 6.5 cm (HORIZN =2) 16 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.36 cm^3-H_2O ·cm^3-soil (HORIZN = 1,2) 0.317 cm^3-H_2O ·cm^3-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.22 cm^3-H_2O ·cm^3-soil (HORIZN = 1,2) 0.197 cm^3-H_2O ·cm^3-soil (HORIZN = 3)	
Organic Carbon Content (OC)	0.29% (HORIZN = 1,2) 0.174% (HORIZN = 3)	

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CALIFORNIA FRUITS: NON-CITRUS (Northern and Southern)

The field used to represent non-citrus fruit production in California is located in Fresno County in the Central Valley, although non-citrus fruit production covers most of the central portion of the state, but mainly on Eastern slopes. According to the 1997 Census of Agriculture, California is the major producer of peaches, plums/prunes, and kiwi for the fresh market, and among the highest producers in other non-citrus fruit such as pears and apples. Areas under and between rows of trees may or may not be maintained depending on the location. Row spacing varies depending on the fruit tree (from approximately 15 to 25 feet) as does the tree spacing (approximately 12 to 20 or more feet). Row canopies tend to be very close to 100 percent, while the canopy between rows is much less to permit the operation of maintenance and harvest equipment. Irrigation is by furrow and flood for most crops, but low-volume drip or micro-sprinkler systems are growing in popularity. The soil selected to simulate the field is a benchmark soil, Exeter loam. Exeter loam, is a fine-loamy, mixed, superactive, thermic Typic Durixeralfs. These soils are often used for citrus production under irrigation. Exeter loam is a moderately deep, moderately well drained, very slow to medium runoff soil that formed in alluvium mainly from granite sources. The soil also consists of a duripan. The Exeter loam has moderately slow permeability above the duripan and very slow permeability within the duripan. These soil are generally found on alluvial fans and stream terraces at elevations of up to 700 feet above mean sea level and have slopes of 0 to 9 percent. The soil is extensive in MLRA 17. Exeter loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Fresno County, California - Fruit (non-Citrus)

Parameter	Value	Source

Starting Date	January 1, 1948	Meteorological File - Southern: Bakersfield, CA (W23155) and Northern: Sacramento, CA (W23232)
Ending Date	December 31, 1983	Meteorological File - Southern: Bakersfield, CA (W23155) and Northern: Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.73	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Snowmelt Factor (SFAC)	0.0 cm C^{-1}	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Fresno County, California - Fruit (non-Citrus)

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.34 tons EI^{-1*}	NRI - Average value listed for the soil series Exeter
USLE LS Factor (USLELS)	0.018	NRI - Average value listed for the soil series Exeter
USLE P Factor (USLEP)	1.0	NRI - Average value listed for the soil series Exeter
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998); based on crops grown on Eastern side of slopes.
Slope (SLP)	9%	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	2 (cropping period only)	Based on recommendations from farm advisors for general flooding for crop irrigation
Irrigation Type (IRTYP)	1 (Flood)	Based on recommendations from farm advisors for general flooding for crop irrigation
Leaching Factor (FLEACH)	0.1	Estimated
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	0.55	Based on recommendations from farm advisors for general flooding for crop irrigation
Maximum Rate at which Irrigation is Applied (RATEAP)	0.4 cm hr^{-1}	PRZM Manual, Table 5.33 (EPA, 1998)

* EI = 100 ft-tons * in/ acre*hr

Table 3. PRZM 3.12 Crop Parameters for Fresno County, California - Fruit (non-Citrus)		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Mark Freeman, Fresno County Cooperative Extension Agent.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Bakersfield, CA (W23155) or Sacramento, CA (W23232)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for grass (EPA, 2001)
Maximum Active Root Depth (AMXDR)	30 cm	Mark Freeman, Fresno County Cooperative Extension Agent.
Maximum Canopy Coverage (COVMAX)	90	Mark Freeman, Fresno County Cooperative Extension Agent.
Soil Surface Condition After Harvest (ICNAH)	3	Mark Freeman, Fresno County Cooperative Extension Agent.
Date of Crop Emergence (EMD, EMM, IYREM)	21/01	Value set to a dates for plums based on Health Effects Division information
Date of Crop Maturity (MAD, MAM, IYRMAT)	21/06	Value set to a dates for plums based on Health Effects Division information
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/08	Value set to a dates for plums based on Health Effects Division information
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3, Meadows, no fallow conditions (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project; C21OCOCM for orchards, covered alley in Sacramento (USDA, 2000)
USLE C Factor (USLEC)	0.034 - 0.221	RUSLE Project; Variable with date, C21OCOCM for orchards, covered alley in Sacramento (USDA, 2000)

Table 4. PRZM 3.12 Exeter Soil Parameters for Fresno County, California - Fruit (non-Citrus)		
Parameter	Value	Verification Source

Total Soil Depth (CORED)	183 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	2 (Base horizons)	
First and Second Soil Horizons (HORIZN = 1,2)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 173 cm (HORIZN = 2)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.59 g $\cdot cm^{-3}$ (HORIZN = 1) 1.76 g $\cdot cm^{-3}$ (HORIZN = 2)	
Initial Water Content (THETO)	0.16 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1) 0.2 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =2)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 17.3 cm (HORIZN = 2)	
Field Capacity (THEFC)	0.16 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.2 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2)	
Wilting Point (THEWP)	0.06 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.11 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2)	
Organic Carbon Content (OC)	0.46% (HORIZN = 1) 0.19% (HORIZN = 2)	

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EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

CALIFORNIA GRAPES (Northern and Southern)

The field used to represent grape production in California is located in Southern San Joaquin Valley. According to the 1997 Census of Agriculture, California is the major producer of table, wine, and raisin grapes with 85 percent of California's production in the San Joaquin Valley and the bulk of the remainder in the Coachella Valley. Grapes need at least 3 ft of well drained soil, and are typically grown on sandy or sandy loam soils. Vine rows are usually kept weed free, but there is some growth in the winter. Surface soil around the vine row is usually sealed, but some plants can grow between vine rows. The soil between rows is usually disked. Row spacing varies depending on the terrain. Canopies between rows tend to be much less than 100 percent, while the canopy along the rows is 100 percent. Irrigation is mainly by drip irrigation, but some vineyards continue to use sprinkler systems. The soil selected to simulate the field is a benchmark soil, San Joaquin loam. San Joaquin loam, is a fine, mixed, active, thermic Abruptic Durixeralfs. These soils are often used for vineyards, fruit and nut production under irrigation. San Joaquin loam is a moderately deep, well and moderately well drained, medium to very high runoff soil that formed in alluvium mainly from granite sources. The soil also consists of a duripan. The San Joaquin loam has very slow permeability above the duripan and very slow permeability within the duripan. Some areas are subject to flooding. These soil are generally found on undulating terraces at elevations from 50 to 500 feet above mean sea level and have slopes of 0 to 9 percent. The soil is extensive in MLRA 17 along the Eastern slopes of the Sacramento and San Joaquin Valleys. San Joaquin loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for San Joaquin Valley, California - Grapes

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Southern: Bakersfield, CA (W23155) and Northern: Sacramento, CA (W23232)
Ending Date	December 31, 1983	Meteorological File - Southern: Bakersfield, CA (W23155) and Northern: Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.7	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.55 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for San Joaquin Valley, California - Grapes		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI^{-1*}	NRI - Average value listed for the soil series San Joaquin
USLE LS Factor (USLELS)	0.2	NRI - Average value listed for the soil series San Joaquin
USLE P Factor (USLEP)	1.0	NRI - Average value listed for the soil series San Joaquin
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998); based on crops grown on Eastern side of slopes.
Slope (SLP)	2%	Paul Verdegaal, San Joaquin County Cooperative Extension 209-468-9494
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	2 (cropping period only)	Based on recommendations from farm advisors for general flooding for crop irrigation
Irrigation Type (IRTYP)	1 (Flood)	Based on recommendations from farm advisors for general flooding for crop irrigation
Leaching Factor (FLEACH)	0.1	Estimated
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	0.55	Based on recommendations from farm advisors for general flooding for crop irrigation
Maximum Rate at which Irrigation is Applied (RATEAP)	0.4 cm hr^{-1}	PRZM Manual, Table 5.33 (EPA, 1998)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for San Joaquin Valley, California - Grapes		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	3	Paul Verdegaal, San Joaquin County Cooperative Extension 209-468-9494
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Bakersfield, CA (W23155) or Sacramento, CA (W23232)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for grass (EPA, 2001)
Maximum Active Root Depth (AMXDR)	100 cm	Paul Verdegaal, San Joaquin County Cooperative Extension 209-468-9494
Maximum Canopy Coverage (COVMAX)	70	Paul Verdegaal, San Joaquin County Cooperative Extension 209-468-9494
Soil Surface Condition After Harvest (ICNAH)	3	Paul Verdegaal, San Joaquin County Cooperative Extension 209-468-9494
Date of Crop Emergence (EMD, EMM, IYREM)	01/02	Paul Verdegaal, San Joaquin County Cooperative Extension 209-468-9494
Date of Crop Maturity (MAD, MAM, IYRMAT)	15/08	Paul Verdegaal, San Joaquin County Cooperative Extension 209-468-9494
Date of Crop Harvest (HAD, HAM, IYRHAR)	31/08	Paul Verdegaal, San Joaquin County Cooperative Extension 209-468-9494
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3, Meadows, no fallow conditions (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project; C21GBGBC for grapes, Sacramento, bare ground (USDA, 2000)
USLE C Factor (USLEC)	0.274 - 0.517	RUSLE Project; Variable with date, C21GBGBC for grapes, Sacramento, bare ground (USDA, 2000)

Table 4. PRZM 3.12 San Joaquin Soil Parameters for San Joaquin Valley, California - Grapes		
Parameter	Value	Verification Source

Total Soil Depth (CORED)	340 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	2 (Base horizons)	
First and Second Soil Horizons (HORIZN = 1,2)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 330 cm (HORIZN = 2)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.84 g $\cdot cm^{-3}$ (HORIZN = 1) 1.6 g $\cdot cm^{-3}$ (HORIZN = 2)	
Initial Water Content (THETO)	0.21 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1) 0.28 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =2)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 30 cm (HORIZN = 2)	
Field Capacity (THEFC)	0.21 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.28 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2)	
Wilting Point (THEWP)	0.1 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.15 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2)	
Organic Carbon Content (OC)	0.72% (HORIZN = 1) 0.16% (HORIZN = 2)	

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

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USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

CALIFORNIA SUGAR BEETS (Northern and Southern)

The field used to represent sugar beet production in California is located in the Central Valley, although sugar beet production covers diverse climates. The major production areas are in the Kalmuth Basin and Imperial Valley. According to 1997 Census of Agriculture, California ranked 4th among producers of sugar beets in the U.S.. Sugar beets are planted almost every month somewhere in the state and are generally grown in rotation. Production concentrates on heavy clay and clay loam soil and are irrigated by both furrow or sprinkler systems. Areas between rows of plants may or may not be maintained. Row spacing is generally 30-inches. Row canopies tend to be very close to 100 percent, while the canopy between rows is much less. The soil selected to simulate the field is a benchmark soil, Exeter loam. Exeter loam, is a fine-loamy, mixed, superactive, thermic Typic Durixeralfs. These soils are often used for citrus production under irrigation. Exeter loam is a moderately deep, moderately well drained, very slow to medium runoff soil that formed in alluvium mainly from granite sources. The soil also consists of a duripan. The Exeter loam has moderately slow permeability above the duripan and very slow permeability within the duripan. These soil are generally found on alluvial fans and stream terraces at elevations of up to 700 feet above mean sea level and have slopes of 0 to 9 percent. The soil is extensive in MLRA 17. Exeter loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Central Valley, California - Sugar beets

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Southern: Bakersfield, CA (W23155) and Northern: Sacramento, CA (W23232)
Ending Date	December 31, 1983	Meteorological File - Southern: Bakersfield, CA (W23155) and Northern: Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.75	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Snowmelt Factor (SFAC)	0.0 cm C^{-1}	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Central Valley, California - Sugar beets		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.34 tons EI^{-1*}	FARM Manual, Table A3 (EPA, 1985)
USLE LS Factor (USLELS)	0.0054	Haan and Barfield, 1979
USLE P Factor (USLEP)	1.0	Per QA/QC Guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998); based on crops grown on Eastern side of slopes.
Slope (SLP)	2%	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	2 (cropping period only)	Based on recommendations from farm advisors for general flooding for crop irrigation
Irrigation Type (IRTYP)	1 (Flood)	Based on recommendations from farm advisors for general flooding for crop irrigation
Leaching Factor (FLEACH)	0.1	Estimated
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	0.55	Based on recommendations from farm advisors for general flooding for crop irrigation
Maximum Rate at which Irrigation is Applied (RATEAP)	0.4 cm hr^{-1}	PRZM Manual, Table 5.33 (EPA, 1998)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Central Valley, California - Sugar beets		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Bakersfield, CA (W23155) or Sacramento, CA (W23232)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Maximum Canopy Coverage (COVMAX)	100	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Soil Surface Condition After Harvest (ICNAH)	1	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Date of Crop Emergence (EMD, EMM, IYREM)	01/02	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Date of Crop Maturity (MAD, MAM, IYRMAT)	31/05	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/08	Kurt Hembree (559.456.7556), UC Cooperative Extension Office, Fresno County
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	89, 86, 87	Gleams Manual Table A.3, Fallow SR/CT/poor, Cropping and Residue = Row Crop SR/CT/poor (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project; C21SUSUC Sacramento climate station, Conventional tillage, no cover (USDA, 2000)
USLE C Factor (USLEC)	0.015 - 0.769	RUSLE Project; Variable with date, C21SUSUC Sacramento climate station, Conventional tillage, no cover (USDA, 2000)

Table 4. PRZM 3.12 Exeter Soil Parameters for Central Valley, California - Sugar beets

Parameter	Value	Verification Source
Total Soil Depth (CORED)	183 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	2 (Base horizons)	
First and Second Soil Horizons (HORIZN = 1,2)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 173 cm (HORIZN = 2)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.59 g $\cdot cm^{-3}$ (HORIZN = 1) 1.76 g $\cdot cm^{-3}$ (HORIZN = 2)	
Initial Water Content (THETO)	0.16 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1) 0.2 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =2)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 17.3 cm (HORIZN = 2)	
Field Capacity (THEFC)	0.16 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.2 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2)	
Wilting Point (THEWP)	0.06 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.11 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2)	
Organic Carbon Content (OC)	0.46% (HORIZN = 1) 0.19% (HORIZN = 2)	

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CALIFORNIA TOMATOES (Northern and Southern)

The field used to represent tomato production in California is located in San Joaquin County in the Central Valley, although tomatoes are produced throughout the Central Valley and Imperial Valley. According to the 1997 Census of Agriculture, California is ranked 2nd in the U.S. in production; 45 percent of California's production is in Stanislaus and Merced Counties. Tomatoes are generally grown on raised beds 60-66 inches wide. Most tomato plants are from transplants grown in nurseries. Row spacing is approximately 30 to 45 inches and plants are grown close together within rows. Spaces between rows are generally kept clear, but plants often grow into these areas. The soil selected to simulate the field is a Stockton clay. Stockton clay is a fine, semectitic, thermic Xeric Epiaquerts. These soils are often used for tomato production under irrigation, but also for other row crops such as corn, beans, sugar beets, and grains. Stockton clay is a deep, somewhat poorly drained, slowly permeable, very slow to slow runoff soil that formed in alluvium of mixed igneous and sedimentary rock sources. These soil are generally found in basins and in swales of drainageways. They are located at elevation of 0 to 100 feet above mean sea level and have slopes of 0 to 2 percent. The soil is of moderate extent. Stockton clay is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Central Valley, California - Tomato

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Southern: Bakersfield, CA (W23155), Northern: Sacramento, CA (W23232)
Ending Date	December 31, 1983	Meteorological File - Southern: Bakersfield, CA (W23155),Northern: Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.7	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.55 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Central Valley, California - Tomato

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.24 tons EI^{-1}*	NRI - Average value listed for the soil series Stockton
USLE LS Factor (USLELS)	0.26	NRI - Average value listed for the soil series Stockton
USLE P Factor (USLEP)	1.0	NRI - Average value listed for the soil series Stockton
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	0.25%	Bob Mullen, San Joaquin County Cooperative Extension. 209-468-9489
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	2 (cropping period only)	Based on recommendations from farm advisors for general flooding for crop irrigation
Flow rate of water entering furrow (Q0)	0.0025 m^3s^{-1}	PRZM Manual, Table 5.35 (EPA, 1998)
Bottom width of furrow (BT)	0.12m	Estimated based on 10-inch furrow width
Furrow side slope (ZRS)	2	PRZM Manual (EPA, 1998)
Furrow slope (SF)	0.005	Maximum field slope
Manning's N for furrow (EN)	0.02	PRZM Manual, Table 5.34 (EPA, 1998)
Furrow length (X2)	300m	PRZM Manual, Table 5.35 (EPA, 1998)
Irrigation Type (IRTYP)	2 (Flood)	Based on recommendations from farm advisors for general flooding for crop irrigation
Leaching Factor (FLEACH)	0.4	Estimated
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	0.55	Based on recommendations from farm advisors for general flooding for crop irrigation
Maximum Rate at which Irrigation is Applied (RATEAP)	0.15 cm hr^{-1}	PRZM Manual, Table 5.33 (EPA, 1998)

* EI = 100 ft-tons * in/ acre*hr

Table 3. PRZM 3.12 Crop Parameters for Central Valley, California - Tomato

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Bob Mullen, San Joaquin County Cooperative Extension. 209-468-9489
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Bakersfield, CA (W23155) or Sacramento, CA (W23232)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PIC; confirmed using Table 5.4 from PRZM Manual (Burns, 1992 and EPA, 1985)
Maximum Active Root Depth (AMXDR)	90 cm	Bob Mullen, San Joaquin County Cooperative Extension. 209-468-9489
Maximum Canopy Coverage (COVMAX)	90	Bob Mullen, San Joaquin County Cooperative Extension. 209-468-9489
Soil Surface Condition After Harvest (ICNAH)	1	Bob Mullen, San Joaquin County Cooperative Extension. 209-468-9489
Date of Crop Emergence (EMD, EMM, IYREM)	01/03	Bob Mullen, San Joaquin County Cooperative Extension. 209-468-9489
Date of Crop Maturity (MAD, MAM, IYRMAT)	01/07	Bob Mullen, San Joaquin County Cooperative Extension. 209-468-9489
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/09	Bob Mullen, San Joaquin County Cooperative Extension. 209-468-9489
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	91, 87, 88	Gleams Manual Table A.3, Fallow = Fallow, SR/ poor; Cropping and Residue = Row Crops SR/poor condition
Manning's N Value (MNGN)	0.023	RUSLE Project; C23BDCGC for dry beans, 2000 lb, Fresno (USDA, 2000)
USLE C Factor (USLEC)	0.035-0.255	RUSLE Project; C23BDCGC for dry beans, 2000 lb, Fresno Variable with date (USDA, 2000)

Table 4. PRZM 3.12 Stockton Soil Parameters for Central Valley, California - Tomato

Parameter	Value	Verification Source

Total Soil Depth (CORED)	180 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 162 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/) Edd Russell (USDA-NRCS, Fresno)
Bulk Density (BD)	1.3 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.4 g $\cdot cm^{-3}$ (HORIZN = 3)	
Initial Water Content (THETO)	0.38 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.25 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN =2) 16.2 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.38 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.25 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.25 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2,3)	
Organic Carbon Content (OC)	0.95% (HORIZN = 1,2) 0.4% (HORIZN = 3)	

Burns. 1992. Burns, L.A., (Coordinator), B.W. Allen, Jr., M.C. Barber, S.L. Bird, J.M. Cheplick, M.J. Fendley, D.R. Hartel, C.A. Kittner, F.L. Mayer, Jr., L.A. Suarez, and S.E. Wooten. *__P__esticide and __I__ndustrial Chemical __R__isk Analysis and __H__azard __A__ssessment, Version 3.0.* (PIRANHA) Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA. 1992.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

CALIFORNIA ALMOND/WALNUTS (Northern and Southern)

The field used to represent almond production in California is located in San Joaquin County in the Central Valley, although almonds production areas are well distributed throughout the Central and Sacramento Valleys. According to the 1997 Census of Agriculture, California is the major producer of almonds and walnuts in the U.S.. Almonds are generally grown on low terraces. All types of irrigation is used. The floor of almond groves are kept smooth and clear to facilitate collection of the nuts after harvesting which is accomplished by shaking the trees. The soil selected to simulate the field is a Manteca fine sandy loam. Manteca fine sandy loam is a coarse-loamy, mixed, thermic Haplic Durixerolls. These soils are often used for a variety of crops including Almonds. Manteca fine sandy loam consists of moderately deep, moderately well drained, slow runoff, moderately permeable above the hardpan soil that formed in alluvium mainly from mixed rock sources. These soil are generally found on low terraces at elevations of 20 to 110 feet above mean sea level and have slopes of 0 to 2 percent. The soil is of small extent in MLRA17. Manteca fine sandy loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for San Joaquin County, California - Almonds

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Southern: Bakersfield, CA (W23155) or Northern: Sacramento, CA (W23232)
Ending Date	December 31, 1983	Meteorological File - Southern: Bakersfield, CA (W23155)or Northern: Sacramento, CA (W23232)
Pan Evaporation Factor (PFAC)	0.7	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.55 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for San Joaquin County, California - Almonds		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI^{-1*}	NRI - Average value listed for the soil series Manteca
USLE LS Factor (USLELS)	0.2	NRI - Average value listed for the soil series Manteca
USLE P Factor (USLEP)	1.0	NRI - Average value listed for the soil series Manteca
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	2 %	Paul Verdegaal, San Joaquin County Cooperative Extension 209-468-9494
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
Irrigation Flag (IRFLAG)	2 (cropping period only)	Based on recommendations from farm advisors for general flooding for crop irrigation
Irrigation Type (IRTYP)	1 (Flood)	Based on recommendations from farm advisors for general flooding for crop irrigation
Leaching Factor (FLEACH)	0.1	Estimated
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	0.55	Based on recommendations from farm advisors for general flooding for crop irrigation
Maximum Rate at which Irrigation is Applied (RATEAP)	0.4 cm hr^{-1}	PRZM Manual, Table 5.33 (EPA, 1998)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for San Joaquin County, California - Almonds		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops EPA, 2001)
Initial Surface Condition (ISCOND)	3	Paul Verdegaal, San Joaquin County Cooperative Extension 209-468-9494
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Bakersfield, CA (W23155) or Sacramento, CA (W23232)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PIC; confirmed using Table 5.4 from PRZM Manual (Burns, 1992 and EPA, 1985)
Maximum Active Root Depth (AMXDR)	120	Paul Verdegaal, San Joaquin County Cooperative Extension 209-468-9494
Maximum Canopy Coverage (COVMAX)	90	Paul Verdegaal, San Joaquin County Cooperative Extension 209-468-9494
Soil Surface Condition After Harvest (ICNAH)	2	Paul Verdegaal, San Joaquin County Cooperative Extension 209-468-9494
Date of Crop Emergence (EMD, EMM, IYREM)	18/01	Values complied by HED for Almonds
Date of Crop Maturity (MAD, MAM, IYRMAT)	02/08	Values complied by HED for Almonds
Date of Crop Harvest (HAD, HAM, IYRHAR)	13/09	Values complied by HED for Almonds
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3, Meadow
Manning’s N Value (MNGN)	0.023	RUSLE Project; C21OCOCM for orchards, cov alley in Sacramento (USDA, 2000)
USLE C Factor (USLEC)	0.34 - 0.221	RUSLE Project; C21OCOCM for orchards, cov alley in Sacramento (USDA, 2000)

Table 4. PRZM 3.12 Manteca Soil Parameters for San Joaquin County, California - Almonds		
Parameter	Value	Verification Source

Total Soil Depth (CORED)	317 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 7 cm (HORIZN = 2) 300 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/) Ed Russell (USDA-NRCS, Fresno)
Bulk Density (BD)	1.55 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.6 g $\cdot cm^{-3}$ (HORIZN = 3)	
Initial Water Content (THETO)	0.22 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.23 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 3.5 cm (HORIZN =2) 30 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.22 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.23 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.1 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.23 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	0.81% (HORIZN = 1,2) 0.18% (HORIZN = 3)	

Burns. 1992. Burns, L.A., (Coordinator), B.W. Allen, Jr., M.C. Barber, S.L. Bird, J.M. Cheplick, M.J. Fendley, D.R. Hartel, C.A. Kittner, F.L. Mayer, Jr., L.A. Suarez, and S.E. Wooten. ***P**esticide and **I**ndustrial Chemical **R**isk Analysis and **H**azard **A**ssessment, Version 3.0.* (PIRANHA) Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA. 1992.

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USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project.

U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

FLORIDA CITRUS

The field used to represent citrus production in Florida is located in Collier or Hendry Counties in Southwest Florida, although citrus production areas cover a substantial portion of the state. Citrus production has been moving southward in an attempt to avoid frost damage that has occurred in recent years. According to the 1997 Census of Agriculture, Florida is the major producer of citrus (oranges) for the juice market and among the highest for the fresh market. Florida is also among the highest producers in other citrus (grapefruit, tangerines, tangelos, and mandarins). Citrus is generally grown in double rows of trees (beds) with swales between to move water off site. Areas under and between rows of trees are generally non-cultivated/non-maintained except for the occasional mowing. Row spacing (pairs or rows) is approximately 20 to 25 feet (paired beds may be less than 20 feet) and between tree spacing is approximately 12 to 15 feet. Row canopies tend to be 100 percent, while the canopy between rows is less to permit the operation of maintenance and harvest equipment. Irrigation is mostly by low-volume drip or micro-sprinkler systems. The soil selected to simulate the field is a Wabasso fine sand. Wabasso fine sand, is a sandy, siliceous, hyperthermic Alfic Alaquods. These soils are often used for citrus production and truck crops. Wabasso fine sand is a deep to very deep, poorly to very poorly drained, slow to ponded runoff, rapidly permeable in the top horizon and slow to very slowly permeable in the lower horizons soil that formed in sandy and loamy marine sediments. These soils are generally found on flatwoods, flood plains, and depressions and have slopes of 0 to 2 percent. The soil is extensive in Florida. Wabasso fine sand is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Collier and Hendry Counties, Florida - Citrus

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Miami, Fl (W12839)
Ending Date	December 31, 1983	Meteorological File - Miami, Fl (W12839)
Pan Evaporation Factor (PFAC)	0.78	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.0 cm C^{-1}	Does not snow in Southern Florida such that accumulation is expected
Minimum Depth of Evaporation (ANETD)	33.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Collier and Hendry Counties, Florida - Citrus		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.1 tons EI^{-1*}	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.093	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.0	Assume no practice under trees.
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1%	Mid-point of soil series range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Collier and Hendry Counties, Florida - Citrus		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to represent fallow field
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Miami, Fl (W12839)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for orchards (EPA, 2001)
Maximum Active Root Depth (AMXDR)	100 cm	Set to maximum of soil profile. Trees may root from 7-18 feet http://edis.ifas.ufl.edu
Maximum Canopy Coverage (COVMAX)	60	http://edis.ifas.ufl.edu
Soil Surface Condition After Harvest (ICNAH)	3	Default, material under trees and between rows is generally left alone
Date of Crop Emergence (EMD, EMM, IYREM)	15/02	Date represent early to mid-season flower bloom for various varieties of citrus http://edis.ifas.ufl.edu
Date of Crop Maturity (MAD, MAM, IYRMAT)	15/10	Date represent late season maturation for various varieties of citrus http://edis.ifas.ufl.edu
Date of Crop Harvest (HAD, HAM, IYRHAR)	15/12	Date represents late season harvest http://edis.ifas.ufl.edu
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	87, 85, 86	Gleams Manual Table A.3, Meadows, no fallow conditions (USDA, 1990)
Manning's N Value (MNGN)	0.014	RUSLE Project; UC0CBCBC; Citrus bare ground; conventional tillage; Tampa, FL (USDA, 2000)
USLE C Factor (USLEC)	0.324 - 0.488	RUSLE Project; Variable with date, UC0CBCBC; Citrus bare ground; conventional tillage; Tampa, FL (USDA, 2000)

Table 4. PRZM 3.12 Wabasso Soil Parameters for Collier and Hendry Counties, Florida - Citrus		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	2 (Base horizons)	
First and Second Soil Horizons (HORIZN = 1,2)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 90 cm (HORIZN = 2)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.45 g $\cdot cm^{-3}$ (HORIZN = 1) 1.75 g $\cdot cm^{-3}$ (HORIZN = 2)	
Initial Water Content (THETO)	0.066 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1) 0.178 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =2)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5 cm (HORIZN = 2)	
Field Capacity (THEFC)	0.066 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.178 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2)	
Wilting Point (THEWP)	0.036 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.078 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2)	
Organic Carbon Content (OC)	2.32% (HORIZN = 1) 0.29% (HORIZN = 2)	

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FLORIDA CUCUMBER (Vegetables)

The field used to represent cucumber (vegetable) production in Florida is located in Collier and Hendry Counties in Southwest Florida, although vegetable production areas include other regions of Florida such as the Everglades Agricultural Area, west-central and south-eastern regions. According to the 1997 Census of Agriculture, Florida is a major producer of truck crops and is the highest producer of cucumbers. Cucumbers and other truck crops are generally grown on “muck soils,” but cucumbers do as well on sandy soils which require less cleaning before marketing. All cucumbers are planted by direct seeding in Florida. Typical planting distances for slicing cucumbers are 48 to 60 inches between rows and 6 to 12 inches between plants. Pickling cucumbers are typically planted at 36 to 48 inches between rows and 2 to 4 inches between plants. When grown using plastic mulch, slicing cucumbers are planted in one or two rows per bed, with 10 to 18 inches between the rows on the bed, 48 to 72 inches between beds, and 8 to 12 inches between holes with one or two plants per hole. Pickling cucumbers are planted at a distance of 3 to 4 inches between plants. At the closest spacing, the plant population is 21,780 per acre. Seeds are planted at a depth of 0.5 to 0.75 inches. Between 35 and 65 days are required from seeding to maturity (first pick). Cucumbers in Florida are produced using several types of irrigation systems. In mulched production, drip, overhead, and seepage irrigation are used. By raising the water table, seepage irrigation restricts root growth to the bed area. Water is maintained approximately 15 to 18 inches below the soil surface, allowing seepage into the root zone. The soil selected to simulate the field is a Riviera sand. Riviera sand is a loamy, siliceous, active, hyperthermic Arenic Glossaqualfs. These soils are often used for truck crop and citrus production. Riviera sand is a deep, poorly drained, slow runoff, slowly to very slowly permeable soil that formed in stratified marine sandy and loamy sediments on the Lower Coastal Plain. These soil are generally found on broad, low flats and in depressions and have slopes generally less than 2 percent. The soil is of moderate extent. Riviera sand is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Collier and Hendry Counties, Florida - Cucumber

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - West Palm Beach, Fl (W12844)
Ending Date	December 31, 1983	Meteorological File - West Palm Beach, Fl (W12844)
Pan Evaporation Factor (PFAC)	0.78	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.0 cm C^{-1}	No appreciable snow accumulation occurs in this part of Florida
Minimum Depth of Evaporation (ANETD)	33.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Collier and Hendry Counties, Florida - Cucumber		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.03 tons EI^{-1*}	PRZM Input Collator (Burns, 1992) and FARM Manual (EPA, 1985)
USLE LS Factor (USLELS)	0.2	Haan and Barfield, 1979
USLE P Factor (USLEP)	1.0	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1%	Mid-point of soil series range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Collier and Hendry Counties, Florida - Cucumber		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Field are fallow prior to planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - West Palm Beach, FL (W12844)
Maximum rainfall Interception storage of crop (CINTCP)	0.15	PIC; confirmed using Table 5.4 from PRZM Manual (Burns, 1992 and EPA, 1985)
Maximum Active Root Depth (AMXDR)	50 cm	Florida Cucumber Crop Profile, USDA
Maximum Canopy Coverage (COVMAX)	80	PIC (Burns, 1992)
Soil Surface Condition After Harvest (ICNAH)	3	Plant residues are left behind until later in the year when tilled for next series of crops; rarely cucumbers.
Date of Crop Emergence (EMD, EMM, IYREM)	10/10	Florida Cucumber Crop Profile, USDA http://pestdata.ncsu.edu/cropprofiles/cropprofiles.cfm
Date of Crop Maturity (MAD, MAM, IYRMAT)	05/12	Florida Cucumber Crop Profile, USDA http://pestdata.ncsu.edu/cropprofiles/cropprofiles.cfm
Date of Crop Harvest (HAD, HAM, IYRHAR)	10/12	Florida Cucumber Crop Profile, USDA http://pestdata.ncsu.edu/cropprofiles/cropprofiles.cfm
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 87, 88	Gleams Manual Table A.3, Fallow = SR poor, Cropping and Residue = Row Crop SR/poor (USDA, 1990)
Manning’s N Value (MNGN)	0.011	RUSLE Project; UC0BGBGC; Green Beans, conventional tillage; Tampa, FL (USDA, 2000)
USLE C Factor (USLEC)	0.162 - 0.938	RUSLE Project; UC0BGBGC; Green Beans, conventional tillage; Tampa, FL, Variable with date (USDA, 2000)

Table 4. PRZM 3.12 Riviera Soil Parameters for Collier and Hendry Counties, Florida - Cucumber		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 62 cm (HORIZN = 2) 28 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/) Ed Russell (USDA-NRCS, Fresno)
Bulk Density (BD)	1.65 g ·cm^{-3} (HORIZN = 1,2) 1.7 g ·cm^{-3} (HORIZN = 3)	
Initial Water Content (THETO)	0.073 cm^3-H_2O ·cm^3-soil (HORIZN =1,2) 0.211 cm^3-H_2O ·cm^3-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN =2,3)	
Field Capacity (THEFC)	0.073 cm^3-H_2O ·cm^3-soil (HORIZN = 1,2) 0.211 cm^3-H_2O ·cm^3-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.023 cm^3-H_2O ·cm^3-soil (HORIZN = 1,2) 0.091 cm^3-H_2O ·cm^3-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174% (HORIZN = 3)	

Burns. 1992. Burns, L.A., (Coordinator), B.W. Allen, Jr., M.C. Barber, S.L. Bird, J.M. Cheplick, M.J. Fendley, D.R. Hartel, C.A. Kittner, F.L. Mayer, Jr., L.A. Suarez, and S.E. Wooten. ***P**esticide and **I**ndustrial Chemical **R**isk Analysis and **H**azard **A**ssessment, Version 3.0.* (PIRANHA) Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA. 1992.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

FLORIDA SUGARCANE

The field used to represent sugarcane production in Florida is located in Hendry County in Southwest Florida, although sugarcane production areas cover an area extending east to the Everglades Agricultural Area. According to the 1997 Census of Agriculture, Florida is the major producer (yield) of sugarcane. Most sugarcane is grown on high organic “muck” soils; approximately 10 percent is grown on mineral soils. Sugarcane is grown on laser-leveled fields by placing short seed “stalks” horizontally in the prepared field. Sugarcane is produced in a three to four year cycle with the first year planting referred to as the “plant cane” crop and successive years referred to as “stubble” or “ratoon” crops which are harvested from regrowth. Yields diminish with each successive crop. At the end of the third or fourth year, sugarcane is rotated to another crop before replanting. Row spacing is approximately 60 inches. Irrigation, when needed, may be accomplished by raising the ground water level through the use of “lateral” drainage systems controlled by locks and spaced from 100 feet to 300 feet apart. The soil selected to simulate the field is a Wabasso fine sand. Wabasso fine sand, is a sandy, siliceous, hyperthermic Alfic Alaquods. These soils are used for sugarcane production, but mainly citrus production and truck crops. Wabasso fine sand is a deep to very deep, poorly to very poorly drained, slow to ponded runoff, rapidly permeable in the top horizon and slow to very slowly permeable in the lower horizons soil that formed in sandy and loamy marine sediments. These soil are generally found on flatwoods, flood plains, and depressions and have slopes of 0 to 2 percent. The soil is extensive in Florida. Wabasso fine sand is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Hendry County, Florida - Sugarcane		
Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Miami, Fl (W12839)
Ending Date	December 31, 1983	Meteorological File - Miami, Fl (W12839)
Pan Evaporation Factor (PFAC)	0.78	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.0 cm C^{-1}	Does not snow in Southern Florida such that accumulation is expected
Minimum Depth of Evaporation (ANETD)	33.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Hendry County, Florida - Sugarcane		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.1 tons EI^{-1*}	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.093	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.0	Assume no practice under trees.
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1%	Mid-point of soil series range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Hendry County, Florida - Sugarcane		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to represent fallow field
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Miami, Fl (W12839)
Maximum rainfall interception storage of crop (CINTCP)	0.1	Set similar to LA Sugarcane; sugarcane is a grass PIC (Burns, 1998)
Maximum Active Root Depth (AMXDR)	100 cm	Set to maximum of soil profile.
Maximum Canopy Coverage (COVMAX)	100	Set to default for row crops (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	3	Default for sugarcane while under 3-4 yr cycle. After cycle, rotate to new crop..
Date of Crop Emergence (EMD, EMM, IYREM)	01/01	typically planted August thru January, See Sugarcane Handbook http://edis.ifas.ufl.edu/
Date of Crop Maturity (MAD, MAM, IYRMAT)	01/06	typically harvested October thru March, See Sugarcane Handbook http://edis.ifas.ufl.edu/
Date of Crop Harvest (HAD, HAM, IYRHAR)	15/12	dates were chosen such that cycle would remain in a single calendar year and still remain within the typical range. See Sugarcane Handbook http://edis.ifas.ufl.edu/
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	94, 91, 92	Gleams Manual Table A.3, Fallow = SR/poor; Cropping and Residue = Row Crop, SR/poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project; UC0SCSCC; Sugarcane, conventional tillage, Tampa (USDA, 2000)
USLE C Factor (USLEC)	0.194 - 0.717	RUSLE Project; Variable with date, UC0SCSCC; Sugarcane, conventional tillage, Tampa (USDA, 2000)

Table 4. PRZM 3.12 Wabasso Soil Parameters for Hendry County, Florida - Sugarcane

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	2 (Base horizons)	
First and Second Soil Horizons (HORIZN = 1,2)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 90 cm (HORIZN = 2)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.45 g $\cdot cm^{-3}$ (HORIZN = 1) 1.75 g $\cdot cm^{-3}$ (HORIZN = 2)	
Initial Water Content (THETO)	0.066 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1) 0.178 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =2)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5 cm (HORIZN = 2)	
Field Capacity (THEFC)	0.066 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.178 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2)	
Wilting Point (THEWP)	0.036 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.078 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2)	
Organic Carbon Content (OC)	2.32% (HORIZN = 1) 0.29% (HORIZN = 2)	

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

FLORIDA SWEET CORN

The field used to represent sweet corn production in Florida is located in Palm Beach County in Southeast Florida, although sweet corn production occurs throughout Florida. According to the 1997 Census of Agriculture, Florida is the major producer of fresh market sweet corn in the U.S. Sweet corn is extensively grown on “muck soils” (approximately 75%). Typical planting distances are 30 inches between rows and 6 to 8 inches between plants. Sweet corn in Florida is produced using several types of irrigation systems. The soil selected to simulate the field is a Riviera sand. Riviera sand is a loamy, siliceous, active, hyperthermic Arenic Glossaqualfs. These soils are often used for truck crop (including sweet corn) and citrus production. Riviera sand is a deep, poorly drained, slow runoff, slowly to very slowly permeable soil that formed in stratified marine sandy and loamy sediments on the Lower Coastal Plain. These soil are generally found on broad, low flats and in depressions and have slopes generally less than 2 percent. The soil is of moderate extent. Riviera sand is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Palm Beach County, Florida - Sweet Corn

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - West Palm Beach, FL (W12844)
Ending Date	December 31, 1983	Meteorological File - West Palm Beach, FL (W12844)
Pan Evaporation Factor (PFAC)	0.78	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.0 cm C^{-1}	No appreciable snow accumulation occurs in this part of Florida
Minimum Depth of Evaporation (ANETD)	33.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Palm Beach County, Florida - Sweet Corn		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.03 tons EI^{-1*}	PRZM Input Collator (Burns, 1992) and FARM Manual (EPA, 1985)
USLE LS Factor (USLELS)	0.2	Haan and Barfield, 1979
USLE P Factor (USLEP)	1.0	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1%	Mid-point of soil series range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Palm Beach County, Florida - Sweet Corn		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Field are fallow prior to planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - West Palm Beach, FL (W12844)
Maximum rainfall interception storage of crop (CINTCP)	0.15	PIC; confirmed using Table 5.4 from PRZM Manual (Burns, 1992 and EPA, 1985)
Maximum Active Root Depth (AMXDR)	100 cm	Set to profile depth. Roots can exceed 150 cm.
Maximum Canopy Coverage (COVMAX)	90	PIC (Burns, 1992)

Soil Surface Condition After Harvest (ICNAH)	3	Plant residues are left behind until later in the year when tilled for next series of crops; rarely cucumbers.
Date of Crop Emergence (EMD, EMM, IYREM)	15/10	http://ipmwww.ncsu.edu/opmppiap/subcrp.htm southern sweet corn cultivation cycle is generally between January and June; Maturation 64-90 days from seeding to harvest; Harvest occurs over a period of weeks to several months. Values set to cover rainy season Oct - Feb.
Date of Crop Maturity (MAD, MAM, IYRMAT)	05/01	
Date of Crop Harvest (HAD, HAM, IYRHAR)	15/01	
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	91, 87, 88	Gleams Manual Table A.3, Fallow = SR/poor; Cropping and Residue = Row Crop, SR/poor condition (USDA, 1990)
Manning's N Value (MNGN)	0.011	RUSLE Project; UC0BGBGC; Green Beans, conventional tillage; Tampa, FL (USDA, 2000)
USLE C Factor (USLEC)	0.162 - 0.938	RUSLE Project; Variable with date, UC0BGBGC; Green Beans, conventional tillage; Tampa, FL (USDA, 2000)

Table 4. PRZM 3.12 Riviera Soil Parameters for Palm Beach County, Florida - Sweet Corn

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 62 cm (HORIZN = 2) 28 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/) Ed Russell (USDA-NRCS, Fresno)
Bulk Density (BD)	1.65 g ·cm^{-3} (HORIZN = 1,2) 1.7 g ·cm^{-3} (HORIZN = 3)	
Initial Water Content (THETO)	0.073 cm^3-H_2O ·cm^3-soil (HORIZN =1,2) 0.211 cm^3-H_2O ·cm^3-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN =2,3)	
Field Capacity (THEFC)	0.073 cm^3-H_2O ·cm^3-soil (HORIZN = 1,2) 0.211 cm^3-H_2O ·cm^3-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.023 cm^3-H_2O ·cm^3-soil (HORIZN = 1,2) 0.091 cm^3-H_2O ·cm^3-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174% (HORIZN = 3)	

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

ILLINOIS CORN

The field used to represent corn production in Illinois is located in McLean County, although the crop is grown extensively throughout the state. According to the 1997 Census of Agriculture, Illinois is ranked 2nd among the major corn producing states in the U.S. The crop is generally planted the early Spring (April) in the south, early May in the north and harvested beginning in August. Continuous corn is practice is much of the region (approximately 30 percent is continuous), however, rotation with other crops such as soybean, wheat, sorghum, and alfalfa is the dominant practice. Most of the corn is planted for feed grain, but may also be planted for oil, sweetener, and for export. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. Conservation tillage practices are regularly used for field corn with no-till practiced on about 20 percent of the corn acreage annually. About 50 percent of the acreage is cultivated with a row cultivator and an estimated 40 percent is rotary hoed annually. The crop is rarely grown under irrigation. The soil selected to simulate the field is an Adair clan loam. Adair clay loam is a fine, smectitic, mesic Aquertic Argiudolls. More than 50 percent of the soil is used for the production of grains with the balance in meadow and pasture. Adair clay loam is a deep, somewhat poorly drained, medium to rapid runoff, slowly permeable soil formed on uplands in a thin mantle of loess or loess and pedisediments and a paleosol formed in glacial till. They are on convex summits of narrow interfluves and on convex side slopes at slightly lower elevations. Slopes are generally between 2 to 18 percent, but may range to 30 percent. The soils are extensive in MLRA 108 and found in many MLRA in the region. Adair clay loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for McLean County, Illinois - Corn

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Burlington, IA (W14931)
Ending Date	December 31, 1983	Meteorological File - Burlington, IA (W14931)
Pan Evaporation Factor (PFAC)	0.77	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	16.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for McLean County, Illinois - Corn		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.32 tons EI^{-1*}	GLEAMS Table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	1.126	GLEAMS Table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for McLean County, Illinois - Corn		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	3	PRZM Input Collator (Burns, 1992); Lyle Paul of U of Illinois indicates residues are typically chiseled in
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Burlington, IA (W14931)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Maximum recommended value for grass
Maximum Active Root Depth (AMXDR)	90 cm	PRZM Input Collator (Burns, 1992)
Maximum Canopy Coverage (COVMAX)	100	PRZM Input Collator (Burns, 1992); Lyle Paul of U of Illinois

Soil Surface Condition After Harvest (ICNAH)	3	PRZM Input Collator (Burns, 1992); Lyle Paul of U of Illinois
Date of Crop Emergence (EMD, EMM, IYREM)	01/05	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984) & Updated Crop Stage Information from HED (Bernard Schneider)
Date of Crop Maturity (MAD, MAM, IYRMAT)	21/09	
Date of Crop Harvest (HAD, HAM, IYRHAR)	20/10	
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	91, 87, 88	Gleams Manual Table A.3, Fallow = SR/poor; Cropping and Residue = Row Crop, SR/poor condition (USDA, 1990)
Manning's N Value (MNGN)	0.014	RUSLE Project, MA3CGSBC; Corn, grain, Conventional tillage, Springfield, IL (USDA, 2000)
USLE C Factor (USLEC)	0.017 - 0.638	RUSLE Project; MA3CGSBC; Corn, grain, Conventional tillage, Springfield, IL, variable with date (USDA, 2000)

Table 4. PRZM 3.12 Adair Soil Parameters for McLean County, Illinois - Corn

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (Top horizon split in two)	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 34 cm (HORIZN = 2) 44 cm (HORIZN = 3) 12 cm (HORIZN = 4)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.5 g $\cdot cm^{-3}$ (HORIZN = 1, 2) 1.6 g $\cdot cm^{-3}$ (HORIZN = 3) 1.7 g $\cdot cm^{-3}$ (HORIZN = 4)	
Initial Water Content (THETO)	0.355 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1, 2) 0.338 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.307 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 6.8 cm (HORIZN = 2) 11 cm (HORIZN = 3) 12 cm (HORIZN = 4)	
Field Capacity (THEFC)	0.355 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1, 2) 0.338 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.307 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	

Wilting Point (THEWP)	0.185 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.208 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.167 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	2.32% (HORIZN = 1,2) 0.174% (HORIZN = 3) 0.116% (HORIZN = 4)	

Burns. 1992. Burns, L.A., (Coordinator), B.W. Allen, Jr., M.C. Barber, S.L. Bird, J.M. Cheplick, M.J. Fendley, D.R. Hartel, C.A. Kittner, F.L. Mayer, Jr., L.A. Suarez, and S.E. Wooten. ***P**esticide and **I**ndustrial Chemical **R**isk Analysis and **H**azard **A**ssessment, Version 3.0.* (PIRANHA) Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA. 1992.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

LOUISIANA SUGARCANE

The field used to represent sugarcane production in Louisiana is located in Terrebonne Parish in South-central Louisiana, although sugarcane production areas cover 21 parishes in the south central part of the state. According to the 1997 Census of Agriculture, Louisiana ranks 2nd in both sugarcane acreage and production. Most sugarcane is grown on well drained soils. Sugarcane is grown on fields with 15- to 18-inch flat bottom furrows or a furrow with a slight ridge of loose soil down the center. The elevated rows or beds are opened and the seed cane planted to a depth at least 3- to 4-inches above the final furrow water level, poorly drained soils will require higher planting. The seed cane is covered with no more than 2 inches of packed soil. Sugarcane is produced in a three to four year cycle with the first year planting referred to as the “plant cane” crop and successive years referred to as “stubble” or “ratoon” crops which are harvested from regrowth. Yields diminish with each successive crop. At the end of the third or fourth year, sugarcane is rotated to another crop or left fallow before replanting. Row spacing is approximately 60 inches. Irrigation is rarely used except in very dry years. The soil selected to simulate the field is a benchmark soil, Commerce silt loam. Commerce silt loam, is a fine-silty, mixed, superactive, nonacid, thermic, Aeric Fluvaquents. These soils are extensively used for sugarcane production. Commerce silt loam is a deep, somewhat poorly drained, medium to slow runoff, slowly permeable soil that formed in loamy alluvial sediments. These soil are generally found on level or undulating alluvial plains and have slopes generally less than 1 percent, but may range up to 5 percent. Agricultural areas are protected by levees; unprotected areas are subject to occasional to frequent flooding. The soil is extensive in Louisiana and throughout the lower Mississippi drainage basin. Commerce silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Terrebonne Parish, Louisiana - Sugarcane

Parameter	Value	Source
Starting Date	January 1, 1964	Meteorological File - Jackson, MS (W03940)
Ending Date	December 31, 1983	Meteorological File - Jackson, MS (W03940)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.0 cm C^{-1}	Does not snow in Southern Louisiana such that accumulation is expected
Minimum Depth of Evaporation (ANETD)	25.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Terrebonne Parish, Louisiana - Sugarcane		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.43 tons EI^{-1*}	PRZM Input Collator (Burns, 1992) and FARM Manual (EPA, 1985)
USLE LS Factor (USLELS)	0.18	NRI for soil series Commerce; 1 standard deviation above the mean
USLE P Factor (USLEP)	1.0	Assume no practice supported
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1%	Assume general value from soils description
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Terrebonne Parish, Louisiana - Sugarcane		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to represent fallow field
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	20	Set to weather data. Meteorological File - Jackson, MS (W03940)
Maximum rainfall interception storage of crop (CINTCP)	0.1	Set to maximum recommended value for grass; sugarcane is in the grass family. PIC (Burns, 1998)
Maximum Active Root Depth (AMXDR)	100 cm	Set to maximum of soil profile (EPA, 2001)
Maximum Canopy Coverage (COVMAX)	100	Set to default for row crops (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	3	Default for sugarcane while under 3-4 yr cycle. After cycle, rotate to new crop or fallow.
Date of Crop Emergence (EMD, EMM, IYREM)	02/11	USDA Agricultural Handbook No. 417 Culture of Sugarcane
Date of Crop Maturity (MAD, MAM, IYRMAT)	06/11	USDA Agricultural Handbook No. 417 Culture of Sugarcane
Date of Crop Harvest (HAD, HAM, IYRHAR)	21/11	USDA Agricultural Handbook No. 417 Culture of Sugarcane
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 87, 88	Gleams Manual Table A.3, Fallow = SR/poor, Cropping and Residue = Row Crops, SR/poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project; TA6SCSCC; Sugarcane, conventional tillage, Lake Charles, LA: actually outside MLRA (USDA, 2000)
USLE C Factor (USLEC)	0.251 - 0.736	RUSLE Project; Variable with date, TA6SCSCC; Sugarcane, conventional tillage, Lake Charles, LA: actually outside MLRA (USDA, 2000)

Table 4. PRZM 3.12 Commerce Soil Parameters for Terrebonne Parish, Louisiana - Sugarcane		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (2 Base horizons, top horizon split in two)	
First, Second and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 16 cm (HORIZN = 2) 74 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.65 g $\cdot cm^{-3}$ (HORIZN = 1,2,3)	
Initial Water Content (THETO)	0.323 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.313 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.323 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.313 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.113 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2,3)	
Organic Carbon Content (OC)	2.32% (HORIZN = 1,2) 0.174% (HORIZN = 3)	

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EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and

Agricultural Research Service (ARS).

MINNESOTA ALFALFA

The field used to represent alfalfa production in Minnesota is located in Polk County in the Red River Valley, however, alfalfa is produced throughout the state. According to the 1997 Census of Agriculture, Minnesota ranked 6th in production of alfalfa in the U.S. Alfalfa is a perennial crop, grown on a variety of soils, planted early in the year and maintained under continuous cultivation on a 3- to 5-year cycle at which time a new crop is planted. Planting depths range from 0.25 to 1.0 inches, depending on soil texture, on level seed beds. Row spacing is approximately 30 inches; very little alfalfa is irrigated in Minnesota because of soil conditions and the depth at which roots may grow (up to 20 feet) help make alfalfa drought tolerant. Cuttings range from 2 to 4 per year and most growers harvest alfalfa when the stand is at 10 percent bloom. Most farmers take the last cutting of the season between mid-August and mid-September. Alfalfa prefers well-drained soils with a pH near neutral (pH 6.7-6.9). The soil selected to simulate the field is a benchmark soil, Bearden silty clay loam. Bearden silty clay loam, is a fine-silty, mixed, superactive, frigid Aeric Calciaquolls. These soils are nearly all under cultivation to small grains, especially alfalfa, and row crops. Bearden silty clay loam is a very deep, somewhat poorly drained, slowly permeable soil with negligible to high runoff. These soils formed in calcareous silt loam and silty clay loam lacustrine sediments. They are generally found on glacial lake plains at elevations from 650 to 2000 feet above mean sea level on slopes of 0 to 3 percent. Bearden silty clay loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Polk County, Minnesota - Alfalfa

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Fargo, ND (W14914)
Ending Date	December 31, 1983	Meteorological File - Fargo, ND (W14914)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.5 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	12.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Polk County, Minnesota - Alfalfa		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI^{-1*}	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.17	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	0.50	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1.5%	Value mid-point of series slope range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Polk County, Minnesota - Alfalfa		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to fallow prior to new crop planting. Http://pestdata.ncsu.edu/cropprofiles
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Fargo, ND (W14914)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	100 cm	Set to maximum soil depth. Roots may grow to 20 feet Http://pestdata.ncsu.edu/cropprofiles
Maximum Canopy Coverage (COVMAX)	100	Dr. Mohamed Kahn; NDSU (701) 231-8596; Larry Smith U of MN (218) 281-8602.
Soil Surface Condition After Harvest (ICNAH)	3	Set to residue for winter months after last harvest during multi-year growth and during winter of last years of growth Http://pestdata.ncsu.edu/cropprofiles
Date of Crop Emergence (EMD, EMM, IYREM)	27/05	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	25/08	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Date of Crop Harvest (HAD, HAM, IYRHAR)	30/08	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	85, 81, 83	Gleams Manual Table A.3, Close-seed legumes SR/poor; Cropping and Residue = Close-seed legumes, SR/good condition (USDA, 1990)
Manning's N Value (MNGN)	0.110	RUSLE Project, F86HLHLC; Hay, Legumes, Conventional tillage, Glasgow, MN (USDA, 2000)
USLE C Factor (USLEC)	0.001 - 0.010	RUSLE Project; F86HLHLC; Hay, Legumes, Conventional tillage, Glasgow, MN (USDA, 2000)

Table 4. PRZM 3.12 Bearden Soil Parameters for Polk County, Minnesota - Alfalfa		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (3 Base Horizons with top horizon split in two)	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 54 cm (HORIZN = 3) 28 cm (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.4 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.5 g $\cdot cm^{-3}$ (HORIZN = 3) 1.8 g $\cdot cm^{-3}$ (HORIZN = 4)	
Initial Water Content (THETO)	0.377 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.292 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.285 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2.0 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.377 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.292cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.285 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.207 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.132 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.125 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	1.74% (HORIZN = 1,2) 0.116% (HORIZN = 3) 0.058% (HORIZN = 4)	

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USDA. 1984. Usual Planting and Harvesting Dates for U.S. Field Crops, Statistical Reporting Service, U.S. Department of Agriculture, Agriculture Handbook #628, pp.78.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

MINNESOTA SUGAR BEETS

The field used to represent sugar beet production in Minnesota is located in Polk County, in the Red River Valley. According to the 1997 Census of Agriculture, Minnesota ranked 1st in production and acreage of sugar beets in the U.S. The crop is generally planted the late Spring and harvested beginning in October. Row spacing is generally 30-inches. Row canopies tend to be very close to 100 percent, while the canopy between rows is much less. The crop may be grown under irrigation by furrow, canal, or center pivot systems. The soil selected to simulate the field is an Adair clan loam. Adair clay loam is a fine, smectitic, mesic Aquertic Argiudolls. More than 50 percent of the soil is used for the production of grains with the balance in meadow and pasture. Adair clay loam is a deep, somewhat poorly drained, medium to rapid runoff, slowly permeable soils formed on uplands in a thin mantle of loess or loess and pedisediments and a paleosol formed in glacial till. They are on convex summits of narrow interfluves and on convex side slopes at slightly lower elevations. Slopes are generally between 2 to 18 percent, but may range to 30 percent. The soils are extensive in MLRA 108 and found in many MLRA in the region. Adair clay loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Polk County, Minnesota - Sugar Beets

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Burlington, IA (W14931)
Ending Date	December 31, 1983	Meteorological File - Burlington, IA (W14931)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)

Snowmelt Factor (SFAC)	0.56 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	12.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Polk County, Minnesota - Sugar Beets		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI^{-1*}	GLEAMS Table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.17	GLEAMS Table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	0.5	PRZM Manual (EPA,1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1.5%	Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Polk County, Minnesota - Sugar Beets		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	PRZM Input Collator (Burns, 1992)
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Burlington, IA (W14931)
Maximum rainfall interception storage of crop (CINTCP)	0.2	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	100 cm	Set to soil profile depth. Roots can be as much as 8 feet deep. Dr. Mohamed Kahn; NDSU (701) 231-8596; Larry Smith U of MN (218) 281-8602.
Maximum Canopy Coverage (COVMAX)	100	PRZM Input Collator (Burns, 1992); Dr. Mohamed Kahn; NDSU (701) 231-8596; Larry Smith U of MN (218) 281-8602.
Soil Surface Condition After Harvest (ICNAH)	3	PRZM Input Collator, PIC (Burns, 1992)
Date of Crop Emergence (EMD, EMM, IYREM)	11/05	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984) & Updated Crop Stage Information from HED (Bernard Schneider)
Date of Crop Maturity (MAD, MAM, IYRMAT)	01/10	
Date of Crop Harvest (HAD, HAM, IYRHAR)	15/10	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 85, 87	Gleams Manual Table A.3, Fallow = SR/poor; Cropping and Residue = Row Crop, SR/poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, F86SUSUC); Sugar beets, Conventional tillage, Fargo, ND (USDA, 2000)
USLE C Factor (USLEC)	0.017 - 0.638	RUSLE Project; F86SUSUC); Sugar beets, Conventional tillage, Fargo, ND (USDA, 2000)

Table 4. PRZM 3.12 Adair Soil Parameters for Polk County, Minnesota - Sugar Beets		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (3 Base, Top horizon split in two)	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 54 cm (HORIZN = 3) 28 cm (HORIZN = 4)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.4 g $\cdot cm^{-3}$ (HORIZN = 1, 2) 1.5 g $\cdot cm^{-3}$ (HORIZN = 3) 1.8 g $\cdot cm^{-3}$ (HORIZN = 4)	
Initial Water Content (THETO)	0.377 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1, 2) 0.292 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.285 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2.0 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.377 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1, 2) 0.292 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.285 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.207 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.132 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.125 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	1.74% (HORIZN = 1,2) 0.116% (HORIZN = 3) 0.058% (HORIZN = 4)	

Burns. 1992. Burns, L.A., (Coordinator), B.W. Allen, Jr., M.C. Barber, S.L. Bird, J.M. Cheplick, M.J. Fendley, D.R. Hartel, C.A. Kittner, F.L. Mayer, Jr., L.A. Suarez, and S.E. Wooten. ***P**esticide and **I**ndustrial Chemical **R**isk Analysis and **H**azard **A**ssessment, Version 3.0.* (PIRANHA) Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA. 1992.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

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USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

MISSISSIPPI CORN

The field used to represent corn production in Mississippi is located in the Southern Mississippi Valley Uplands. According to the 1997 Census of Agriculture, Mississippi is not a major corn producing state in the U.S. (not among the top 20 states) with approximately 600,000 acres in production. The crop is generally planted in the early Spring (April) and harvested beginning in August. Continuous corn is practice is much of the region, however, rotation with other crops such as soybean is the practiced as well. Most of the corn is planted for feed grain. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. Conventional tillage dominates with more than 50 percent of the practice, followed by conservation tillage, no-tillage, and ridge tillage. The crop is rarely grown under irrigation. The soil selected to simulate the field is a benchmark soil, Grenada silt loam. Grenada silt loam is a fine-silty, mixed, active, thermic Oxyaquic Fraglossudalfs. Most of the soil is used for the production of row crops such as corn, cotton, and soybeans, the principal crops. Grenada silt loam is a very deep, moderately well drained, medium to slow runoff, moderately permeable above a fragipan and slow in the fragipan soil. The fragipan is at a depth of about two feet. The soils formed in loess. They are located on uplands and stream terraces of low relief in the Southern Mississippi Valley Silty Uplands. Slopes are generally between 0 to 8 percent, but may range to 12 percent. The soils are extensive throughout the region. Grenada silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Southern Mississippi Valley Uplands, Mississippi - Corn

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Little Rock AR (W13963)
Ending Date	December 31, 1983	Meteorological File - Little Rock AR (W13963)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.25 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	25.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Southern Mississippi Valley Uplands, Mississippi - Corn		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.43 tons EI^{-1*}	GLEAMS Table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.221	GLEAMS Table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Mid-point of series range. Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Southern Mississippi Valley Uplands, Mississippi - Corn		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	PRZM Input Collator (Burns, 1992)
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Little Rock AR (W13963)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	PRZM Input Collator; (Burns, 1992); PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	PRZM Input Collator (Burns, 1992); Set to default for most row crops (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	3	PRZM Input Collator, PIC (Burns, 1992)
Date of Crop Emergence (EMD, EMM, IYREM)	11/04	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	22/08	
Date of Crop Harvest (HAD, HAM, IYRHAR)	02/09	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 87, 88	Gleams Manual Table A.3, Fallow = SR/poor, Cropping and Residue = Row Crop, SR/Poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, OA6CGSBC; Corn, grain, conventional tillage, Natchez, MS (USDA, 2000)
USLE C Factor (USLEC)	0.024 - 0.848	RUSLE Project; OA6CGSBC; Corn, grain, conventional tillage, Natchez, MS (USDA, 2000)

Table 4. PRZM 3.12 Grenada Soil Parameters for Southern Mississippi Valley Uplands, Mississippi - Corn		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (3 Base, Top horizon split in two)	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 44 cm (HORIZN = 2) 8 cm (HORIZN = 3) 38 cm (HORIZN = 4)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.7 g $\cdot cm^{-3}$ (HORIZN = 1, 2) 1.8 g $\cdot cm^{-3}$ (HORIZN = 3,4)	
Initial Water Content (THETO)	0.309 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1, 2) 0.304 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.216 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.309 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1, 2) 0.304 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.216 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.109 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.104 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.116 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174% (HORIZN = 3) 0.116% (HORIZN = 4)	

Burns. 1992. Burns, L.A., (Coordinator), B.W. Allen, Jr., M.C. Barber, S.L. Bird, J.M. Cheplick, M.J. Fendley, D.R. Hartel, C.A. Kittner, F.L. Mayer, Jr., L.A. Suarez, and S.E. Wooten. ***P**esticide and **I**ndustrial Chemical **R**isk Analysis and **H**azard **A**ssessment, Version 3.0.* (PIRANHA) Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA. 1992.

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Field Crops, Statistical Reporting Service, U.S. Department of Agriculture, Agriculture Handbook #628, pp.78.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

MISSISSIPPI COTTON

The field used to represent cotton production in Mississippi is located in Yazoo County. According to the 1997 Census of Agriculture, Mississippi is ranked 4th in production and acreage of cotton in the U.S. The crop is generally planted in Spring (late April) and harvested beginning in September. Row spacing is generally 38-inches with 3-4 plants per foot row. Row canopies tend to be very close to 100 percent, while the canopy between rows is much less. The crop may be grown under irrigation by furrow or canal systems. Most crops are planted by stale seedbed, no-till, or conventional methods. The soil selected to simulate the field is a Loring silt loam. Loring silt loam is a fine-silty, mixed, active, thermic, Qxyaquic Fragiudalfs. Nearly all soils are cleared and used to grow cotton, small grains, soybeans, hay and pasture. Loring silt loam is a moderately well drained with a fragipan, medium to rapid runoff, moderate permeability above the fragipan and moderately slowly permeable in the fragipan soils formed in loess. They are located on level to strongly sloping uplands and stream terraces. Slopes are generally between 0 to 20 percent. The soils are extensive in the lower Mississippi drainage basin. Loring silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Yazoo County, Mississippi - Cotton

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Little Rock, AR (W13963)
Ending Date	December 31, 1983	Meteorological File - Little Rock, AR (W13963)

Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Pan Factor Flag (IPEIND)	2	PAN Evaporation data read from file
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Yazoo County, Mississippi - Cotton		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.49 tons EI^{-1*}	EXPRES; PRZM Manual Table 5.3 (EPA, 1998)
USLE LS Factor (USLELS)	0.4	EXPRES; PRZM Manual Table 5.5 (EPA, 1998)
USLE P Factor (USLEP)	0.75	EXPRES; PRZM Manual Table 5.6 (EPA,1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Yazoo County, Mississippi - Cotton		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	PRZM Input Collator (Burns, 1992)
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Little Rock, AR (W13963)
Maximum rainfall interception storage of crop (CINTCP)	0.2	EXPRES; PRZM manual Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	125 cm	EXPRES; Value developed from field specific data.
Maximum Canopy Coverage (COVMAX)	98	EXPRES; Value developed from field specific data.
Soil Surface Condition After Harvest (ICNAH)	3	PRZM Input Collator (Burns, 1992)
Date of Crop Emergence (EMD, EMM, IYREM)	01/05	EXPRES and verified with Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	07/09	
Date of Crop Harvest (HAD, HAM, IYRHAR)	22/09	
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	99, 93, 32	EXPRES; PRZM Manual Table 5.10-5.14 and Fig. 5.4; Field specific data.
Manning's N Value (MNGN)	0.014	RUSLE Project, PA6CTCTC: Cotton, conventional tillage, Holly Springs, MS (USDA, 2000)
USLE C Factor (USLEC)	0.223 - 0.718	RUSLE Project; PA6CTCTC: Cotton, conventional tillage, Holly Springs, MS (USDA, 2000)

Table 4. PRZM 3.12 Loring Soil Parameters for Yazoo County, Mississippi - Cotton		
Parameter	Value	Verification Source

Total Soil Depth (CORED)	155 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	6	
First, Second, Third, Fourth, Fifth, and Sixth Soil Horizons (HORIZN = 1,2,3,4,5,6)		
Horizon Thickness (THKNS)	13 cm (HORIZN = 1) 23 cm (HORIZN = 2) 33 cm (HORIZN = 3) 30 cm (HORIZN = 4) 23 cm (HORIZN = 5) 33 cm (HORIZN = 6)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) [http://www.statlab.iastate.edu/soils/ssl/)](http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.4 $g \cdot cm^{-3}$ (HORIZN = 1,2,3) 1.45 $g \cdot cm^{-3}$ (HORIZN = 4) 1.49 $g \cdot cm^{-3}$ (HORIZN = 5) 1.51 $g \cdot cm^{-3}$ (HORIZN = 6)	
Initial Water Content (THETO)	0.385 cm^3-H_2O ·cm^3-soil (HORIZN =1) 0.370 cm^3-H_2O ·cm^3-soil (HORIZN =2,3) 0.340 cm^3-H_2O ·cm^3-soil (HORIZN =4) 0.335 cm^3-H_2O ·cm^3-soil (HORIZN =5) 0.343 cm^3-H_2O ·cm^3-soil (HORIZN =6)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1.0 cm (HORIZN = 2) 11 cm (HORIZN = 3) 10 cm (HORIZN = 4) 23 cm (HORIZN = 5) 33 cm (HORIZN = 6)	
Field Capacity (THEFC)	0.385 cm^3-H_2O ·cm^3-soil (HORIZN =1) 0.370 cm^3-H_2O ·cm^3-soil (HORIZN =2,3) 0.340 cm^3-H_2O ·cm^3-soil (HORIZN =4) 0.335 cm^3-H_2O ·cm^3-soil (HORIZN =5) 0.343 cm^3-H_2O ·cm^3-soil (HORIZN =6)	
Wilting Point (THEWP)	0.151 cm^3-H_2O ·cm^3-soil (HORIZN = 1) 0.146 cm^3-H_2O ·cm^3-soil (HORIZN = 2,3) 0.125 cm^3-H_2O ·cm^3-soil (HORIZN = 4) 0.137 cm^3-H_2O ·cm^3-soil (HORIZN = 5) 0.147 cm^3-H_2O ·cm^3-soil (HORIZN = 6)	
Organic Carbon Content (OC)	1.28% (HORIZN = 1) 0.49% (HORIZN = 2) 0.16% (HORIZN = 3) 0.12% (HORIZN = 4) 0.07% (HORIZN = 5) 0.06% (HORIZN = 6)	

Burns. 1992. Burns, L.A., (Coordinator), B.W. Allen, Jr., M.C. Barber, S.L. Bird, J.M. Cheplick, M.J. Fendley, D.R. Hartel, C.A. Kittner, F.L. Mayer, Jr., L.A. Suarez, and S.E. Wooten. ***P**esticide and **I**ndustrial Chemical **R**isk Analysis and **H**azard **A**ssessment, Version 3.0.* (PIRANHA) Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA. 1992.

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Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

USDA. 1984. Usual Planting and Harvesting Dates for U.S. Field Crops, Statistical Reporting Service, U.S. Department of Agriculture, Agriculture Handbook #628, pp.78.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

MISSISSIPPI SOYBEANS

The field used to represent soybean production in Mississippi is located in Yazoo County. According to the 1997 Census of Agriculture, Mississippi harvested more than 2 million acres of soybeans and ranks 12th in production in the U.S. The crop is generally planted in Spring (late April) and harvested beginning in September. Row spacing is generally 30 to 38-inches, but spacing could be a little as 7 inches. Field canopies tend to be very close to 100 percent early in the season and less as harvest nears. The crop may be grown under irrigation by furrow or canal systems. Most crops are planted by conventional tillage, but, no-till, or conservation methods are employed as well. The soil selected to simulate the field is a Loring silt loam. Loring silt loam is a fine-silty, mixed, active, thermic, Qxyaquic Fragiudalfs. Nearly all soils are cleared and used to grow cotton, small grains, soybeans, hay and pasture. Loring silt loam is a moderately well drained with a fragipan, medium to rapid runoff, moderate permeability above the fragipan and moderately slowly permeable in the fragipan soils formed in loess.

They are located on level to strongly sloping uplands and stream terraces. Slopes are generally between 0 to 20 percent. The soils are extensive in the lower Mississippi drainage basin. Loring silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Yazoo County, Mississippi - Soybeans

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Little Rock, AR (W13963)
Ending Date	December 31, 1983	Meteorological File - Little Rock, AR (W13963)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.25 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Yazoo County, Mississippi - Soybeans		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.42 tons EI^{-1*}	FARM Manual, Table 3.1 (EPA, 1985 0
USLE LS Factor (USLELS)	0.051	Haan and Barfield, 1978. Input data from: Tim Pepper, Yazoo Co. Ag Extension Agent (622-746-2453)
USLE P Factor (USLEP)	0.75	Tim Pepper, Yazoo Co. Ag Extension Agent (622-746-2453)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	2%	Tim Pepper, Yazoo Co. Ag Extension Agent (622-746-2453)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Yazoo County, Mississippi - Soybeans		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	PRZM Input Collator (Burns, 1992)
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Little Rock, AR (W13963)
Maximum rainfall interception storage of crop (CINTCP)	0.2	PRZM Manual, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	30 cm	PRZM Manual, Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	Default for row crops (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	3	Tim Pepper, Yazoo Co. Ag Extension Agent (622-746-2453)
Date of Crop Emergence (EMD, EMM, IYREM)	15/04	Tim Pepper, Yazoo Co. Ag Extension Agent (622-746-2453)
Date of Crop Maturity (MAD, MAM, IYRMAT)	01/09	
Date of Crop Harvest (HAD, HAM, IYRHAR)	10/10	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	87, 84, 86	Gleams Manual Table A.3; Fallow = SR/poor, Cropping and Residue = Row Crop, SR/poor
Manning’s N Value (MNGN)	0.014	RUSLE Project, OA6SBCGC; Soybean, conventional tillage, Natchez, MS. Using boarding LRR (O) (USDA, 2000)
USLE C Factor (USLEC)	0.040 - 0.654	RUSLE Project; OA6SBCGC; Soybean, conventional tillage, Natchez, MS. Using boarding LRR (O) (USDA, 2000)

Table 4. PRZM 3.12 Loring Soil Parameters for Yazoo County, Mississippi - Soybeans

Parameter	Value	Verification Source
Total Soil Depth (CORED)	155 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	6	
First, Second, Third, Fourth, Fifth, and Sixth Soil Horizons (HORIZN = 1,2,3,4,5,6)		
Horizon Thickness (THKNS)	13 cm (HORIZN = 1) 23 cm (HORIZN = 2) 33 cm (HORIZN = 3) 30 cm (HORIZN = 4) 23 cm (HORIZN = 5) 33 cm (HORIZN = 6)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.4 g ·cm^{-3} (HORIZN = 1,2,3) 1.45 g ·cm^{-3} (HORIZN = 4) 1.49 g ·cm^{-3} (HORIZN = 5) 1.51 g ·cm^{-3} (HORIZN = 6)	
Initial Water Content (THETO)	0.385 cm^3-H_2O ·cm^3-soil (HORIZN =1) 0.370 cm^3-H_2O ·cm^3-soil (HORIZN =2,3) 0.340 cm^3-H_2O ·cm^3-soil (HORIZN =4) 0.335 cm^3-H_2O ·cm^3-soil (HORIZN =5) 0.343 cm^3-H_2O ·cm^3-soil (HORIZN =6)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1.0 cm (HORIZN = 2) 11 cm (HORIZN = 3) 10 cm (HORIZN = 4) 23 cm (HORIZN = 5) 33 cm (HORIZN = 6)	
Field Capacity (THEFC)	0.385 cm^3-H_2O ·cm^3-soil (HORIZN =1) 0.370 cm^3-H_2O ·cm^3-soil (HORIZN =2,3) 0.340 cm^3-H_2O ·cm^3-soil (HORIZN =4) 0.335 cm^3-H_2O ·cm^3-soil (HORIZN =5) 0.343 cm^3-H_2O ·cm^3-soil (HORIZN =6)	
Wilting Point (THEWP)	0.151 cm^3-H_2O ·cm^3-soil (HORIZN = 1) 0.146 cm^3-H_2O ·cm^3-soil (HORIZN = 2,3) 0.125 cm^3-H_2O ·cm^3-soil (HORIZN = 4) 0.137 cm^3-H_2O ·cm^3-soil (HORIZN = 5) 0.147 cm^3-H_2O ·cm^3-soil (HORIZN = 6)	
Organic Carbon Content (OC)	1.28% (HORIZN = 1) 0.49% (HORIZN = 2) 0.16% (HORIZN = 3) 0.12% (HORIZN = 4) 0.07% (HORIZN = 5) 0.06% (HORIZN = 6)	

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EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

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NORTH CAROLINA ALFALFA (Western)

The field used to represent alfalfa production in North Carolina is located in Western North Carolina. According to the 1997 Census of Agriculture, North Carolina is not a major producer of alfalfa (not among the top 20 producing states) in the U.S. Alfalfa is a perennial crop, grown on a variety of soils, planted early in the year and maintained under continuous cultivation on a 3- to 5-year cycle at which time a new crop is planted. Planting depths range from 0.25 to 1.0 inches, depending on soil texture, on level seed beds. Row spacing is approximately 30 inches; alfalfa is not irrigated in North Carolina. Cuttings range from 2 to 4 per year. Most farmers take the last cutting of the season in September. Alfalfa prefers well-drained soils with a pH near neutral (pH 6.7-6.9). The soil selected to simulate the field is a Helena sandy loam. Helena sandy loam, is a fine, mixed, semiactive, thermic, Aquic Hapludults. Much of these soils are under cultivation in tobacco, corn soybeans, small grains, and vegetable. Helena sandy loam is a very deep, moderately well drained, slowly permeable soil with medium to rapid runoff. These soils formed in residuum weathered from a mixture of felsic, intermediate, or mafic igneous or high grade metamorphic rocks. They are found on broad ridges and toeslopes of the Piedmont uplands on slopes of 2 to 10 percent, but can range from 0 to 15 percent. Helena sandy loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Western North Carolina - Alfalfa

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Bristol, TN (W13877)
Ending Date	December 31, 1983	Meteorological File - Bristol, TN (W13877)
Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.25 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Western North Carolina - Alfalfa		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.29 tons EI^{-1*}	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	1.34	Haan and Barfield, 1978.
USLE P Factor (USLEP)	0.50	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Value mid-point of series slope range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Western North Carolina - Alfalfa

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to fallow prior to new crop planting.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Bristol, TN (W13877)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	100 cm	Set to maximum soil depth. Roots may grow to 20 feet.
Maximum Canopy Coverage (COVMAX)	100	Set to default for row crops (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	3	Set to residue for winter months after last harvest during multi-year growth and during winter of last years of growth.
Date of Crop Emergence (EMD, EMM, IYREM)	05/04	http://forage.cas.psu.edu/docs/species/alfalfa.html http://forages.orst.edu/IS/NAIS/default.cfm NC has both Fall and Spring plantings. Set to Spring planting period using mid-point dates. Emergence 7-10 days after planting. Maturation occurs approximately 60 days after planting. Three and sometimes 4 cuttings per season. Harvest set to last event assuming 4 cuttings since Fall planting begins late August early Sept. in NC. Each cutting may occur 28-30 days after last.
Date of Crop Maturity (MAD, MAM, IYRMAT)	28/05	
Date of Crop Harvest (HAD, HAM, IYRHAR)	28/08	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	87, 83, 86	Gleams Manual Table A.3, pasture/range, non-CNT, poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.110	RUSLE Project, NB0PWPWN; Pasture, warm-season, no-till, Asheville, NC (USDA, 2000)
USLE C Factor (USLEC)	0.004	RUSLE Project; NB0PWPWN; Pasture, warm-season, no-till, Asheville, NC (USDA, 2000)

Table 4. PRZM 3.12 Helena Soil Parameters for Western North Carolina - Alfalfa

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (Top horizon split in two)	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 20 cm (HORIZN = 2) 18 cm (HORIZN = 3) 52 cm (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.55 $g \cdot cm^{-3}$ (HORIZN = 1,2) 1.51 $g \cdot cm^{-3}$ (HORIZN = 3) 1.5 $g \cdot cm^{-3}$ (HORIZN = 4)	
Initial Water Content (THETO)	0.153 cm^3-$H_2O \cdot cm^3$-soil (HORIZN =1,2) 0.250 cm^3-$H_2O \cdot cm^3$-soil (HORIZN =3) 0.322 cm^3-$H_2O \cdot cm^3$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2,3) 2.0 cm (HORIZN = 4)	
Field Capacity (THEFC)	0.153 cm^3-$H_2O \cdot cm^3$-soil (HORIZN = 1,2) 0.250cm^3-$H_2O \cdot cm^3$-soil (HORIZN = 3) 0.322 cm^3-$H_2O \cdot cm^3$-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.053 cm^3-$H_2O \cdot cm^3$-soil (HORIZN = 1,2) 0.120 cm^3-$H_2O \cdot cm^3$-soil (HORIZN = 3) 0.192 cm^3-$H_2O \cdot cm^3$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174 (HORIZN = 3) 0.116% (HORIZN = 4)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

NORTH CAROLINA APPLES (Western)

The field used to represent apple production in North Carolina is located in Henderson County, in Western North Carolina. According to the 1997 Census of Agriculture, North Carolina is among the major producers of apples (7^{th} to 8^{th} overall) in the U.S., and is one of the southern most production areas. There are four primary apple production areas in western North Carolina, all long-term perennial regions, grown on a variety of soils, in different climate regions. Henderson County produces between 60 to 70 percent of the apple crop. Within row tree spacing depends on the root stock and cultivation method. Spacing ranges from as little as 5 feet to 25 feet. Row spacing may be as much as twice the within row spacing to allow for maintenance and harvesting equipment. The soil selected to simulate the field is a benchmark soil, Hayesville loam. Hayesville loam, is a fine, kaolinitic, mesic, Typic Kanhapludults. About one-half of these soils are under cultivation in corn, small grains, pasture, hayland, tobacco, vegetables, and Christmas trees. Hayesville loam is a very deep, well drained, moderately rapid permeable soil with slow to high runoff depending on slope. These soils formed in residuum weathered from igneous and high-grade metamorphic rocks. They are found on gently sloping to very steep ridges and side slopes of the Southern Appalachian Mountains. They are located at elevations from 100 to 4000 feet above mean sea level on slopes of 2 to 60. The series is of large extent in the mountain areas of lower South. Hayesville loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Henderson County North Carolina - Apples		
Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Bristol, TN (W13877)
Ending Date	December 31, 1983	Meteorological File - Bristol, TN (W13877)
Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.2 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Henderson County North Carolina - Apples

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.2 tons EI^{-1*}	GLEAMS Table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	3.04	GLEAMS Table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed. (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	12%	Value set to maximum for crop (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)

* EI = 100 ft-tons * in/ acre*hr

Table 3. PRZM 3.12 Crop Parameters for Henderson County North Carolina - Apples		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	3	Set to reside prior to new crop planting; forest floor or meadow.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Bristol, TN (W13877)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Set to default for orchards (EPA, 2001)
Maximum Active Root Depth (AMXDR)	150 cm	Set to maximum soil depth. Roots may grow to 20 feet.
Maximum Canopy Coverage (COVMAX)	90	http://caf.wvu.edu/kearneyville/fruitloop.html ; Ross Byers, Horticultural Specialist VPI - canopy somewhat open between rows; 90% reasonable upper end estimate.
Soil Surface Condition After Harvest (ICNAH)	3	Orchards floor maintained similar to a meadow
Date of Crop Emergence (EMD, EMM, IYREM)	07/04	Personal communication w/ Ross Byers, VA Tech Fruit Horticulturalist (540) 869-2560 x19" Emergence based on leaf emergence, Maturation based on canopy maturity, Harvest based on average leaf fall. Dates based on central VA and modified by: 1 day added for every 100 miles north or 100 feet higher elevation or 1day subtracted for every 100 miles south or 100 feet lower elevation.
Date of Crop Maturity (MAD, MAM, IYRMAT)	03/05	
Date of Crop Harvest (HAD, HAM, IYRHAR)	25/10	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3, meadow; condition good (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project, NB0OBOBC; Orchard bare ground; conventional tillage; Asheville, NC (USDA, 2000)
USLE C Factor (USLEC)	0.008 - 0.057	RUSLE Project; NB0OBOBC; Orchard bare ground; conventional tillage; Asheville, NC (USDA, 2000)

Table 4. PRZM 3.12 Hayesville Soil Parameters for Henderson County North Carolina - Apples		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	150 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (3 Base, Top horizon split in two)	
First, Second, Third, and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 6 cm (HORIZN = 2) 84 cm (HORIZN = 3) 50 cm (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.30 g $\cdot cm^{-3}$ (HORIZN = 1,2,3,4)	
Initial Water Content (THETO)	0.392 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.475 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.259 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3) 5.0 cm (HORIZN = 4)	
Field Capacity (THEFC)	0.392 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.475cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.259 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.192 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.275 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.109 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	0.58% (HORIZN = 1,2) 0.116 (HORIZN = 3) 0.058% (HORIZN = 4)	

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U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

NORTH CAROLINA CORN (Eastern)

The field used to represent corn production in Eastern North Carolina is located in Pitt County in the Piedmont. According to the 1997 Census of Agriculture, North Carolina is ranked 9th among major corn producing states in the U.S. Corn is produced throughout the state with the largest production located in the coastal plain and tidewater regions. Sweet corn is produced mainly on the coastal plain (MLRA 153 A and B). The crop is generally planted the early Spring (April) and harvested beginning in August. Continuous corn is practice is much of the region, especially the Piedmont. However, rotation with other crops such as soybean is practiced on the coastal plain. Most of the corn is planted for feed grain. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. Conventional tillage dominates management practices, followed by no-tillage. However, conservation tillage is continuing to grow. The crop is rarely grown under irrigation, except for sweet corn. The soil selected to simulate the field is a Craven silt loam. Craven silt loam is a fine, mixed, subactive, thermic Aquic Hapludults. Approximately one-half of the series is used for the production of row crops such as corn, tobacco, cotton, small grain, peanuts and pasture. Craven silt loam is a deep, moderately well drained, medium to rapid runoff, slowly permeable soil formed in clayey Pleistocene sediments. They are located on nearly level to sloping Coastal Plain Uplands. Slopes are generally between 0 to 12 percent. The soils are extensive throughout the Coastal Plain region. Craven silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Pitt County North Carolina - Eastern Corn		
Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Montgomery, AL (W13895)
Ending Date	December 31, 1983	Meteorological File - Montgomery, AL (W13895)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	15.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Pitt County North Carolina - Eastern Corn		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.24 tons EI^{-1*}	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	1.34	Haan and Barfield, 1978.
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Mid-point of series range. Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Pitt County North Carolina - Eastern Corn		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	3	Sam Uzzell, Pitt County Extension
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Montgomery, AL (W13895)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	PRZM Input Collator; (Burns, 1992); PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	PRZM Input Collator (Burns, 1992); Set to default for most row crops. (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	3	Sam Uzzell, Pitt County Extension
Date of Crop Emergence (EMD, EMM, IYREM)	11/04	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	28/08	
Date of Crop Harvest (HAD, HAM, IYRHAR)	12/09	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	89, 86, 87	Gleams Manual Table A.3,Fallow SR/CT/poor, Cropping and Residue = Row Crop SR/CT/poor (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, PB6CGWWC Field corn, conventional tillage, Greensboro (USDA, 2000)
USLE C Factor (USLEC)	0.105 - 0.471	RUSLE Project; PB6CGWWC Field corn, conventional tillage, Greensboro (USDA, 2000)

Table 4. PRZM 3.12 Craven Soil Parameters for Pitt County North Carolina - Eastern Corn

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 12 cm (HORIZN = 2) 78 cm (HORIZN = 3)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.45 g $\cdot cm^{-3}$ (HORIZN = 1,2,3)	
Initial Water Content (THETO)	0.194 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1, 2) 0.321 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.194 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1, 2) 0.321 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.074 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.201 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174% (HORIZN = 3)	

Burns. 1992. Burns, L.A., (Coordinator), B.W. Allen, Jr., M.C. Barber, S.L. Bird, J.M. Cheplick, M.J. Fendley, D.R. Hartel, C.A. Kittner, F.L. Mayer, Jr., L.A. Suarez, and S.E. Wooten. ***P**esticide and **I**ndustrial Chemical **R**isk Analysis and **H**azard **A**ssessment, Version 3.0.* (PIRANHA) Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA. 1992.

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

NORTH CAROLINA CORN (Western)

The field used to represent corn production in Western North Carolina is located in Henderson County. According to the 1997 Census of Agriculture, North Carolina is ranked 9th among major corn producing states in the U.S. Corn is planted throughout the state with the largest production located in the coastal plain and tidewater regions. Sweet corn is produced mainly on the coastal plain (MLRA 153 A and B). The crop is generally planted in the early Spring (April) and harvested beginning in August. Continuous corn is practice is much of the region, especially in the Piedmont. However, rotation with other crops such as soybean is the principal practiced on the coastal plain. Most of the corn is planted for feed grain. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. Conventional tillage dominates management practices, followed by no-tillage. However, conservation tillage is continuing to grow. The crop is rarely grown under irrigation, except for sweet corn. The soil selected to simulate the field is a Chewacla loam. Chewacla loam is a fine-loamy, mixed, active, thermic Fluvaquentic Dystrudepts. Most of the series is cleared for pasture or planted in row crops, mostly corn with the remainder in small grain and hay. Chewacla loam is a very deep, somewhat poorly drained, slow runoff, moderately permeable soil formed in recent alluvium washed largely from soils formed in residuum from metamorphic and igneous rocks. They are located on flood plains. Slopes are generally between 0 to 2 percent. The soils are extensive throughout the region. Chewacla loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Henderson County North Carolina - Western Corn

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Bristol, TN (W13877)

Ending Date	December 31, 1983	Meteorological File - Bristol, TN (W13877)
Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.2 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Henderson County North Carolina - Western Corn

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.29 tons EI^{-1*}	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	0.19	Haan and Barfield, 1978.
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1%	http://www.statlab.iastate.edu/soils/osd/dat/C/CHEWACLA.html
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)

* EI = 100 ft-tons * in/ acre*hr

Table 3. PRZM 3.12 Crop Parameters for Henderson County North Carolina - Western Corn		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to conditions prior to crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Bristol, TN (W13877)
Maximum rainfall interception storage of crop (CINTCP)	0.3	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	PRZM Input Collator; (Burns, 1992); PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	PRZM Input Collator (Burns, 1992); Set to default for most row crops. (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	3	PRZM Input Collator, PIC (Burns, 1992)
Date of Crop Emergence (EMD, EMM, IYREM)	26/04	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	02/09	
Date of Crop Harvest (HAD, HAM, IYRHAR)	17/09	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	89, 86, 87	Gleams Manual Table A.3,Fallow SR/CT/poor, Cropping and Residue = Row Crop SR/CT/poor (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, NB0CGHLC, Corn, Grain, conventional tillage, Asheville, NC (USDA, 2000)
USLE C Factor (USLEC)	0.100 - 0.462	RUSLE Project; NB0CGHLC, Corn, Grain, conventional tillage, Asheville, NC (USDA, 2000)

Table 4. PRZM 3.12 Chewacla Soil Parameters for Henderson County North Carolina - Western Corn		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (Top horizon split in two)	
First, Second, Third, and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1,2) 40 cm (HORIZN = 3,4)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.6 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.5 g $\cdot cm^{-3}$ (HORIZN = 3,4)	
Initial Water Content (THETO)	0.244 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1, 2) 0.270 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.269 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.244 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1, 2) 0.270 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.269 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.094 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.12 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.119 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	2.32% (HORIZN = 1,2) 0.174% (HORIZN = 3) 0.116% (HORIZN = 4)	

Burns. 1992. Burns, L.A., (Coordinator), B.W. Allen, Jr., M.C. Barber, S.L. Bird, J.M. Cheplick, M.J. Fendley, D.R. Hartel, C.A. Kittner, F.L. Mayer, Jr., L.A. Suarez, and S.E. Wooten. ***P**esticide and **I**ndustrial Chemical **R**isk Analysis and **H**azard **A**ssessment, Version 3.0.* (PIRANHA) Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA. 1992.

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

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EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control

of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

USDA. 1984. Usual Planting and Harvesting Dates for U.S. Field Crops, Statistical Reporting Service, U.S. Department of Agriculture, Agriculture Handbook #628, pp.78.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

NORTH CAROLINA COTTON

The field used to represent cotton production in North Carolina is located in the Piedmont/Coastal Plain. According to the 1997 Census of Agriculture, North Carolina is ranked 5th among the major cotton producing states in the U.S. Most cotton is grown in the coastal plain region and approximately 3 percent in the Piedmont. Cotton is planted in the early Spring (mid-April) and harvested beginning in October. Continuous cotton is practice is much of the region and cotton is gradually replacing land once cultivated in tobacco. Row spacing is generally 38-inches with 3-4 plants per foot row. Row canopies tend to be very close to 100 percent, while the canopy between rows is much less. All cotton is defoliated in North Carolina prior to harvesting. Conventional tillage is the dominant practice, but, conservation tillage, no-till and strip-till practices are gaining in popularity in the region. The crop is rarely grown under irrigation, approximately 5 percent. The soil selected to simulate the field is a Boswell fine sandy loam. Boswell fine sandy loam is a fine, mixed, active, thermic Vertic Paleudalfs. Very little of the soil is in cotton and most remains in woodland or pasture. Boswell fine sandy loam is a deep, moderately well drained, moderate to rapid runoff, very slowly permeable soils formed in marine fluviatile deposits of acid clayey sediments. These soils have a high shrink-swell potential. They are located on nearly level to steep uplands of the Southern Coastal Plain. Slopes are generally between 1 to 17 percent. The soils are of large extent in the Southern Coastal Plain region. Boswell fine sandy loam is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for the Piedmont/Coastal Plain of North Carolina - Cotton

Parameter	Value	Source
Starting Date	January 1, 1950	Meteorological File - Montgomery, AL (W13895)
Ending Date	December 31, 1983	Meteorological File - Montgomery, AL (W13895)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for the Piedmont/Coastal Plain of North Carolina - Cotton		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.34 tons EI^{-1*}	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	1.3	Haan and Barfield, 1978.
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for the Piedmont/Coastal Plain of North Carolina - Cotton		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to default for fallow surface prior to planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	34	Set to weather data. Meteorological File - Montgomery, AL (W13895)
Maximum rainfall interception storage of crop (CINTCP)	0.2	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	60 cm	PRZM Input Collator; (Burns, 1992); PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	98	PRZM Input Collator, PIC (Burns, 1992)
Soil Surface Condition After Harvest (ICNAH)	3	Residues left on field until following year or cover crop is planted.
Date of Crop Emergence (EMD, EMM, IYREM)	01/06	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	01/08	
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/11	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	92, 89, 90	Gleams Manual Table; Fallow SR/CT/poor, Cropping and Residue = Row Crop SR/CT/poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, PB8CTCTC, actually for Columbia, SC cotton, conv till (USDA, 2000)
USLE C Factor (USLEC)	0.228 - 0.748	RUSLE Project; PB8CTCTC, actually for Columbia, SC cotton, conv till (USDA, 2000)

Table 4. PRZM 3.12 Boswell Soil Parameters for the Piedmont/Coastal Plain of North Carolina - Cotton		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 2 cm (HORIZN = 2) 88 cm (HORIZN = 3)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.8 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.7 g $\cdot cm^{-3}$ (HORIZN = 3)	
Initial Water Content (THETO)	0.213 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1, 2) 0.354 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2) 4 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.213 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1, 2) 0.354 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.063 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.213 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	2.32% (HORIZN = 1,2) 0.29% (HORIZN = 3)	

Burns. 1992. Burns, L.A., (Coordinator), B.W. Allen, Jr., M.C. Barber, S.L. Bird, J.M. Cheplick, M.J. Fendley, D.R. Hartel, C.A. Kittner, F.L. Mayer, Jr., L.A. Suarez, and S.E. Wooten. ***P**esticide and **I**ndustrial Chemical **R**isk Analysis and **H**azard **A**ssessment, Version 3.0.* (PIRANHA) Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA. 1992.

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EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

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USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

NORTH CAROLINA PEANUTS

The field used to represent peanut production in North Carolina is located in East Pitt County in the Coastal Plain. According to the 1997 Census of Agriculture, North Carolina is ranked 3rd among the major peanut producing states in the U.S., accounting for approximately 10 percent of the total U.S. crop. Peanuts are produced mainly on the northeastern coastal plain and a small amount is produced in the southeastern region. The crop is generally planted in the Spring (mid-April to early May) and harvested beginning in September. Crop rotation is the most important cultural practice, with a long rotation (3 years) followed by two years of a grass-type crop being among the most effective management practices for nematode, diseases, and weed control. Most plantings occurs on raised beds. Row spacing is generally 30 to 48 inches. Conventional tillage is practiced in the region, but strip-tillage and no-tillage practices are becoming more popular. The crop is rarely grown under irrigation, approximately 10 percent. The soil selected to simulate the field is a Craven silt loam. Craven silt loam is a fine, mixed, subactive, thermic Aquic Hapludults. Approximately one-half of the series is used for the production of row crops such as corn, tobacco, cotton, small grain, peanuts and pasture. Craven silt loam is a deep, moderately well drained, medium to rapid runoff, slowly permeable soils formed in clayey Pleistocene sediments. They are located on nearly level to sloping Coastal Plain Uplands. Slopes are generally between 0 to 12 percent. The soils are extensive throughout the Coastal Plain region. Craven silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Pitt County North Carolina - Peanuts

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Montgomery, AL (W13895)
Ending Date	December 31, 1983	Meteorological File - Montgomery, AL (W13895)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Pitt County North Carolina - Peanuts		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	)PRZM Manual (EPA, 1998
USLE K Factor (USLEK)	0.24 tons EI^{-1*}	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	1.34	Haan and Barfield, 1978.
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Mid-point of series range. Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Pitt County North Carolina - Peanuts

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	3	American Peanut Council http://peanutsusa.com/what/growing.html
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Meteorological File - Montgomery, AL (W13895)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	45 cm	PRZM Input Collator; (Burns, 1992); PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	80	PRZM Input Collator, PIC (Burns, 1992)
Soil Surface Condition After Harvest (ICNAH)	3	American Peanut Council http://peanutsusa.com/what/growing.html - assuming plants used for hay (can also be left in field)
Date of Crop Emergence (EMD, EMM, IYREM)	11/04	Usual Planting and Harvest Dates for US Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	28/08	
Date of Crop Harvest (HAD, HAM, IYRHAR)	12/09	
Maximum Dry Weight (WFMAX)	0.0	Set to "0" Not used in simulation
SCS Curve Number (CN)	89, 84, 86	Gleams Manual Table; close seeded legume, C soil, fallow = fallow SR/CT poor; cropping and residue = legumes SR poor condition (USDA, 1990)
Manning's N Value (MNGN)	0.014	RUSLE Project, PB9PRPRC- runner peanuts, Augusta GA (nearest peanut) (USDA, 2000)
USLE C Factor (USLEC)	0.047 - 0.668	RUSLE Project; PB9PRPRC- runner peanuts, Augusta GA (nearest peanut) (USDA, 2000)

Table 4. PRZM 3.12 Craven Soil Parameters for Pitt County North Carolina - Peanuts		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 12 cm (HORIZN = 2) 78 cm (HORIZN = 3)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.45 g $\cdot cm^{-3}$ (HORIZN = 1,2,3)	
Initial Water Content (THETO)	0.194 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1, 2) 0.321 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.194 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1, 2) 0.321 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.074 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.201 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174% (HORIZN = 3)	

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NORTH CAROLINA TOBACCO

The field used to represent tobacco (flue-cured) production in North Carolina is located in Pitt and Johnston Counties, in Eastern North Carolina. According to the 1997 Census of Agriculture, North Carolina is the major producer of tobacco (1st overall) in the U.S. Tobacco is grown on a wide variety of soils, however, maximum yields are typically seen on sandy loam soils with low organic matter content. In addition, tobacco roots do not tolerate “wet” soils for prolong periods of time. Approximately 90 percent of the crop is grown in two-year rotation. Row spacing is generally from 40 to 48 inches. Tobacco is transplanted from greenhouse or plastic-covered outdoor plant beds in early spring after frost pressures (mid-April). Flower heads are removed to induce growth of lateral shoots. Harvesting is done in stages from lowest to highest leaves on the plant as the leaves ripen. Nearly all (99 percent) of tobacco is grown with conventional tillage. No-till production is used mostly for burley tobacco grown in western North Carolina. The soil selected to simulate the field is a benchmark soil, Norfolk loamy sand. Norfolk loamy sand is a fine-loamy, kaolinitic, thermic, Typic Kandiudults. Most of these soils are under cultivation in corn, cotton, peanuts, tobacco and soybeans. Norfolk loamy sand is a very deep, well drained, moderately permeable soil with slow to medium runoff. These soils formed in loamy marine sediments of the Coastal Plain. They are found on level to gently sloping uplands of the Coastal Plain. Slopes range from 0 to 10 percent. The series is of large extent throughout the Coastal Plan. Norfolk loamy sand is a Hydrologic Group B soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Pitt and Johnston Counties, North Carolina - Tobacco

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Montgomery, AL (W13895)
Ending Date	December 31, 1983	Meteorological File - Montgomery, AL (W13895)
Pan Evaporation Factor (PFAC)	0.77	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Pitt and Johnston Counties, North Carolina - Tobacco		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.17 tons EI^{-1*}	GLEAMS Table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.192	GLEAMS Table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	0.5	PRZM Table 5.6 value for contour plowing on 5% slope (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	5%	Value set to mid-point of range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Pitt and Johnston Counties, North Carolina - Tobacco

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to fallow ground prior to years planting (bed preparation)
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Montgomery, AL (W13895)
Maximum rainfall interception storage of crop (CINTCP)	0.2	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	60 cm	PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	80	NCSU Crop Profile http://ipmwww.ncsu.edu/ncpmip/
Soil Surface Condition After Harvest (ICNAH)	3	Residue left until following year
Date of Crop Emergence (EMD, EMM, IYREM)	11/04	PRZM Table 5.9 and NCSU Crop Profile http://ipmwww.ncsu.edu/ncpmip/
Date of Crop Maturity (MAD, MAM, IYRMAT)	07/07	
Date of Crop Harvest (HAD, HAM, IYRHAR)	16/07	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 83	Gleams Manual Table A.3, Fallow SR/CT/poor, Cropping and Residue = Row Crop SR/CT/poor; B soil (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, PB6TBHGC; Tobacco, conventional tillage; Greensboro, NC (USDA, 2000)
USLE C Factor (USLEC)	0.071 - 0.500	RUSLE Project; PB6TBHGC; Tobacco, conventional tillage; Greensboro, NC (USDA, 2000)

Table 4. PRZM 3.12 Norfolk Soil Parameters for Pitt and Johnston Counties, North Carolina - Tobacco

Parameter	Value	Verification Source
Total Soil Depth (CORED)	150 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (Top horizon split in two)	
First, Second, Third, and Fourth and Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 35 cm (HORIZN = 2) 55 cm (HORIZN = 3) 50 cm (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.55 $g \cdot cm^{-3}$ (HORIZN = 1,2) 1.3 $g \cdot cm^{-3}$ (HORIZN = 3) 1.1 $g \cdot cm^{-3}$ (HORIZN = 4)	
Initial Water Content (THETO)	0.199 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.406 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.396 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5.0 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.199 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.406cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.396 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.089 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.206 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.246 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	0.29% (HORIZN = 1,2) 0.116 (HORIZN = 3) 0.058% (HORIZN = 4)	

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

NORTH DAKOTA CORN

The field used to represent corn production in North Dakota is located in Pembina County in the Red River Valley. According to the 1997 Census of Agriculture, North Dakota is ranked 19th among major producers of corn in the U.S. The crop is generally planted the Spring (April) and harvested beginning in August. Continuous corn is practice is much of the region. However, rotation with other crops such as wheat is also practiced. Most of the corn is planted for feed grain. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. Conventional tillage dominates management practices, followed by no-tillage. However, conservation tillage is continuing to grow. The crop is often grown under irrigation. The soil selected to simulate the field is a benchmark soil, Bearden silty clay loam. Bearden silty clay loam, is a fine-silty, mixed, superactive, frigid Aeric Calciaquolls. These soils are nearly all under cultivation to small grains, especially alfalfa, and row crops. Bearden silty clay loam is a very deep, somewhat poorly drained, slowly permeable soil with negligible to high runoff. These soils formed in calcareous silt loam and silty clay loam lacustrine sediments. They are generally found on glacial lake plains at elevations from 650 to 2000 feet above mean sea level on slopes of 0 to 3 percent. Bearden silty clay loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Pembina County, North Dakota Corn		
Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Fargo, ND (W14914)
Ending Date	December 31, 1983	Meteorological File - Fargo, ND (W14914)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36m C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Pembina County, North Dakota Corn		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI^{-1*}	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.17	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	2%	Value mid-point of series slope range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Pembina County, North Dakota Corn		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set fallow prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Fargo, ND (W14914)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	PRZM Manual, Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	QA/QC Guidance (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	1	Fallow conditions after harvest in preparation for winter crop
Date of Crop Emergence (EMD, EMM, IYREM)	05/05	http://www.ext.nodak.edu/extpubs/plantsci/rowcrops/
Date of Crop Maturity (MAD, MAM, IYRMAT)	05/08	http://www.ext.nodak.edu/extpubs/plantsci/rowcrops
Date of Crop Harvest (HAD, HAM, IYRHAR)	12/08	http://www.ext.nodak.edu/extpubs/plantsci/rowcrops
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	88, 86, 87	Gleams Manual Table A.3, Fallow SR/CT, poor condition; Cropping and Residue = Row Crop SR/CT/Poor (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project, F86CGWSC; Corn, grain, conventional tillage, Fargo, ND (USDA, 2000)
USLE C Factor (USLEC)	0.028 - 0.305	RUSLE Project; F86CGWSC; Corn, grain, conventional tillage, Fargo, ND (USDA, 2000)

Table 4. PRZM 3.12 Bearden Soil Parameters for Pembina County, North Dakota Corn		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 54 cm (HORIZN = 3) 28 cm (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.4 g $\cdot$cm^{-3} (HORIZN = 1,2) 1.5 g $\cdot$cm^{-3} (HORIZN = 3) 1.8 g $\cdot$cm^{-3} (HORIZN = 4)	
Initial Water Content (THETO)	0.377 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =1,2) 0.292 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =3) 0.285 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2.0 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.377 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 1,2) 0.292cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 3) 0.285 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.207 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 1,2) 0.132 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 3) 0.125 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 4)	
Organic Carbon Content (OC)	1.74% (HORIZN = 1,2) 0.116% (HORIZN = 3) 0.058% (HORIZN = 4)	

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

NORTH DAKOTA WHEAT

The field used to represent wheat production in North Dakota is located in Cass County in the Red River Valley. According to the 1997 Census of Agriculture, North Dakota is ranked 1st in the production of both durum and spring wheat in the U.S. The crop is generally planted in the Spring (late April to the end of May) and harvested beginning in August. Continuous wheat is practice is much of the region. Conventional tillage is used but requires greater seedbed preparation. No-till and reduced tillage systems are designed for use in high residue conditions. Row spacing ranges from 6 to 9 inches with seeds planted at a depth of 2 inches or less. The soil selected to simulate the field is a benchmark soil, Bearden silty clay loam. Bearden silty clay loam, is a fine-silty, mixed, superactive, frigid Aeric Calciaquolls. These soils are nearly all under cultivation to small grains, especially alfalfa, and row crops. Bearden silty clay loam is a very deep, somewhat poorly drained, slowly permeable soil with negligible to high runoff. These soils formed in calcareous silt loam and silty clay loam lacustrine sediments. They are generally found on glacial lake plains at elevations from 650 to 2000 feet above mean sea level on slopes of 0 to 3 percent. Bearden silty clay loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Cass County, North Dakota Wheat

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Fargo, ND (W14914)
Ending Date	December 31, 1983	Meteorological File - Fargo, ND (W14914)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.5m C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	12.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Cass County, North Dakota Wheat		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.28 tons EI^{-1*}	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.17	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1.5%	Value mid-point of series slope range (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Cass County, North Dakota Wheat		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to fallow prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Fargo, ND (W14914)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	22 cm	PRZM Manual, Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	QA/QC Guidance (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	1	Fallow conditions after harvest in preparation for winter crop
Date of Crop Emergence (EMD, EMM, IYREM)	15/05	Planting and Harvesting dates for spring wheat adjusted for ""C"" value planting and harvesting date (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	25/07	Planting and Harvesting dates for spring wheat adjusted for ""C"" value planting and harvesting date (USDA, 1984)
Date of Crop Harvest (HAD, HAM, IYRHAR)	08/08	Planting and Harvesting dates for spring wheat adjusted for ""C"" value planting and harvesting date (USDA, 1984)
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 85, 87	Gleams Manual Table A.3, Fallow = SR/CT poor; Cropping = Row Crop SR/CT poor (second number; Fallow = row crop SR/CT poor (3rd number) (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, F86WSFA Fargo, ND spring wheat, fallow, conventional tillage (USDA, 2000)
USLE C Factor (USLEC)	0.036 - 0.617	RUSLE Project; F86WSFA Fargo, ND spring wheat, fallow, conventional tillage (USDA, 2000)

Table 4. PRZM 3.12 Bearden Soil Parameters for Cass County, North Dakota Wheat		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4	
First, Second, Third and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 54 cm (HORIZN = 3) 28 cm (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.4 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.5 g $\cdot cm^{-3}$ (HORIZN = 3) 1.8 g $\cdot cm^{-3}$ (HORIZN = 4)	
Initial Water Content (THETO)	0.377 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.292 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.285 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2.0 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.377 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.292cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.285 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Wilting Point (THEWP)	0.207 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.132 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.125 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	1.74% (HORIZN = 1,2) 0.116% (HORIZN = 3) 0.058% (HORIZN = 4)	

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 1984. Usual Planting and Harvesting Dates for U.S. Field Crops, Statistical Reporting Service, U.S. Department of Agriculture, Agriculture Handbook #628, pp.78.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

OREGON APPLES

The field used to represent apple production in Oregon is located in Marion County, in the Willamette Valley. According to the 1997 Census of Agriculture, Oregon is among the major producers (7^{th} to 8^{th} overall) of apples for the fresh market in the U.S. Within row tree spacing depends on the root stock and cultivation method. Spacing ranges from as little as 5 feet to 25 feet. Row spacing may be as much as twice the within row spacing to allow for maintenance and harvesting equipment. The soil selected to simulate the field is a Cornelius silt loam. Cornelius silt loam, is a fine-silty, mixed, superactive, mesic Mollic Fragixeralfs. The series is used to produce berries, orchards, small grain and seed crop, hay and pasture. Cornelius silt loam is a moderately deep, moderately well drained, moderately slowly permeable soil with slow to medium runoff. The soil has a fragipan at about 2 feet. These soils formed in silt loess-like materials over mixed, fine-silty old alluvium of mixed origin. They are found on gently sloping to rolling low hills ans steep hill slopes with convex, long slopes and ridgetops at elevation of 350 to 800 feet above mean sea level. Slopes range from 2 to 60 percent. The series is not very extensive. Cornelius silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Marion County Oregon - Apples

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Salem, OR (W24232)
Ending Date	December 31, 1983	Meteorological File - Salem, OR (W24232)
Pan Evaporation Factor (PFAC)	0.74	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Marion County Oregon - Apples		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.33 tons EI^{-1*}	Farm Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	3.64	Haan and Barfield, 1978
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	12%	Value set to maximum for crop (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Marion County Oregon - Apples		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	3	Set to reside prior to new crop planting; forest floor or meadow.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Salem, OR (W24232)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Set to default for orchards (EPA, 2001)
Maximum Active Root Depth (AMXDR)	45 cm	Set to this limit due to soil fragipan. Some limited roots may tap below the top of the fragipan.
Maximum Canopy Coverage (COVMAX)	98	http://caf.wvu.edu/kearneyville/fruitloop.html Ross Byers, Horticultural Specialist VPI - canopy somewhat open between rows; 98% reasonable upper end estimate for the region
Soil Surface Condition After Harvest (ICNAH)	3	Orchards floor maintained similar to a meadow
Date of Crop Emergence (EMD, EMM, IYREM)	25/04	leaf-out, full canopy, leaf fall info from Steve Castagnoli, Hood River OR Extension
Date of Crop Maturity (MAD, MAM, IYRMAT)	31/05	
Date of Crop Harvest (HAD, HAM, IYRHAR)	07/11	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3, meadow; condition good (USDA, 1990)
Manning’s N Value (MNGN)	0.040	RUSLE Project, A13OFOFN for orchards, no-till-Salem, OR (USDA, 2000)
USLE C Factor (USLEC)	0.005 - 0.034	RUSLE Project; A13OFOFN for orchards, no-till-Salem, OR (USDA, 2000)

Table 4. PRZM 3.12 Cornelius Soil Parameters for Marion County Oregon - Apples		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	148 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	5 (4 Base with top split in two)	
First, Second, Third, Fourth, and Fifth Soil Horizons (HORIZN = 1,2,3,4,5)		
Horizon Thickness (THKNS)	15 cm (HORIZN = 1,3) 13 cm (HORIZN = 2) 55 cm (HORIZN = 4) 50 cm (HORIZN = 5)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.30 g $\cdot cm^{-3}$ (HORIZN = 1) 1.38 g $\cdot cm^{-3}$ (HORIZN = 2) 1.58 g $\cdot cm^{-3}$ (HORIZN = 3) 1.52 g $\cdot cm^{-3}$ (HORIZN = 4) 1.46 g $\cdot cm^{-3}$ (HORIZN = 5)	
Initial Water Content (THETO)	0.329 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1) 0.338 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =2) 0.340 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.358 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4) 0.202 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =5)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1.0 cm (HORIZN = 2,3) 5.0 cm (HORIZN = 4,5)	
Field Capacity (THEFC)	0.329 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1) 0.338 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =2) 0.340 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.358 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4) 0.202 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =5)	
Wilting Point (THEWP)	0.099 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.108 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2) 0.110 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.148 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4) 0.142 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 5)	
Organic Carbon Content (OC)	2.30% (HORIZN = 1) 1.11% (HORIZN = 2) 0.21% (HORIZN = 3) 0.145% (HORIZN = 4) 0.07% (HORIZN = 5)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure

Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

OREGON BERRIES (Blackberries)

The field used to represent blackberry production in Oregon is located in Marion County, in the Willamette Valley. According to the 1997 Census of Agriculture, Oregon is the leading state in the production of blackberries in the U.S. Marion County leads Oregon in acres planted in 1997. Three types of blackberries grow in Oregon: trailing, erect, and semi-erect. Blackberries are planted in the Spring from tissue cultures 4 to 6 feet apart in rows. The primocanes are trained on a 2-wire trellis until the canes produce fruit the following year. Once fruit appear, new primocanes replace the previous year's. It take three years to start full production of blackberries. Fields may be in every year or alternate year production. Berries are picked every 4 to 5 days, in the morning, beginning in early July. Blackberries require supplemental watering through irrigation in such a manner as to prevent excessive and prolonged wetness which encourages disease. The soil selected to simulate the field is a benchmark soil, Woodburn silt loam. Woodburn silt loam, is a fine-silty mixed, superactive, mesic Aquultic Agrixerolls. The series is used to produce berries, orchards, cannery crops, grain, hay, and pasture. Woodburn silt loam is a very deep, moderately well drained, slowly permeable soil with slow to medium runoff. These soils formed in stratified glacio lacustrine deposits of the Pleistocene age. They are found on nearly level to gently sloping broad valley terraces at elevations of 150 to 400 feet above mean sea level on slopes of 0 to 55 percent. The series is extensive in the Willamette Valley. Woodburn silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Marion County Oregon - Berries		
Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Salem, OR (W24232)
Ending Date	December 31, 1983	Meteorological File - Salem, OR (W24232)
Pan Evaporation Factor (PFAC)	0.73	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.16 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Marion County Oregon - Berries		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.32 tons EI^{-1*}	GLEAMS Manual, Table of Representative Soils (USDA, 1985)
USLE LS Factor (USLELS)	0.945	GLEAMS Manual, Table of Representative Soils (USDA, 1985)
USLE P Factor (USLEP)	0.5	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	5%	GLEAMS Manual, Table of Representative Soils (USDA, 1985)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Marion County, Oregon - Berries		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to residue prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Salem, OR (W24232)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM Manual, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	Bernadine Strik, Oregon State University; strikb@bcc.orst.edu
Maximum Canopy Coverage (COVMAX)	20	Bernadine Strik, Oregon State University; strikb@bcc.orst.edu
Soil Surface Condition After Harvest (ICNAH)	2	Continuous cultivation
Date of Crop Emergence (EMD, EMM, IYREM)	07/04	Bernadine Strik, Oregon State University; strikb@bcc.orst.edu
Date of Crop Maturity (MAD, MAM, IYRMAT)	30/07	
Date of Crop Harvest (HAD, HAM, IYRHAR)	30/07	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3,Meadow, condition good. (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project, A12GBGBC Grapes Alleyway, Clear Rows (USDA, 2000)
USLE C Factor (USLEC)	0.302 - 0.553	RUSLE Project; A12GBGBC Grapes Alleyway, Clear Rows (USDA, 2000)

Table 4. PRZM 3.12 Woodburn Soil Parameters for Marion County, Oregon - Berries		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	203 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	7 (Top horizon split in two)	
First, Second, Third, Fourth, Fifth, Sixth, and Seventh Soil Horizons (HORIZN = 1,2,3,4,5,6,7)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 13 cm (HORIZN = 2) 20 cm (HORIZN = 3) 40 cm (HORIZN = 4,6) 50 cm (HORIZN = 2) 30 cm (HORIZN = 7)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.44 g $\cdot cm^{-3}$ (HORIZN = 1,2,5) 1.53 g $\cdot cm^{-3}$ (HORIZN = 3) 1.45 g $\cdot cm^{-3}$ (HORIZN = 4) 1.37 g $\cdot cm^{-3}$ (HORIZN = 6,7)	
Initial Water Content (THETO)	0.301 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.350 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.388 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4) 0.394 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =5) 0.418 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =6) 0.404 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =7)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1.0 cm (HORIZN = 2) 2.0 cm (HORIZN = 3,4) 5.0 cm (HORIZN = 5,6) 10.0 cm (HORIZN = 7)	
Field Capacity (THEFC)	0.301 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.350 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.388 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4) 0.394 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =5) 0.418 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =6) 0.404 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =7)	
Wilting Point (THEWP)	0.134 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.153 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.177 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4) 0.185 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 5) 0.173 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 6) 0.156 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 7)	
Organic Carbon Content (OC)	1.86% (HORIZN = 1,2) 0.56% (HORIZN = 3) 0.3% (HORIZN = 4) 0.112% (HORIZN = 5) 0.07% (HORIZN = 6) 0.06% (HORIZN = 7)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

OREGON CHRISTMAS TREES

The field used to represent Christmas tree production in Oregon is located in Benton County, in the Willamette Valley. According to the 1997 Census of Agriculture, Oregon is the leading producer of Christmas trees in the U.S. with approximately 8 million trees harvested each year. More than a dozen varieties of trees are produced in the region; Douglas fir represents about half of the Pacific Northwest Production. Tree production is a long-term investment with average size trees requiring approximately 7 to 8 years to reach market size (7 to 8 foot). Modern tree operations require intensive site preparation prior to planting, including tillage, soil fertility enhancement and use of cover crops. Tree are mechanically planted in late winter and early spring. Most grower do not have a grass cover crop, but smaller operations keep a mulch grass or living sod in place. Seedlings may be hand planted in difficult or adverse sites or to replace dead trees in first or second year established plantations. Nearly all growers plant 2 to 4-year-old seedlings or 3 to 5-year-old transplants. Trees seldom require irrigation. About 2 to 3 years after planting, trees are sheared or shaped to create the shape of high-quality Christmas trees and to control the amount of annual growth and in some species increase bud set. Nearly all trimming occurs during the summer months based on tree species. Trees are harvested beginning in late October and will continue through mid-December. The soil selected to represent the field is a benchmark soil, Pilchuck fine sand. Pilchuck fine sand is a mixed, mesic Dystric Xeropsamments. The series is mostly pasture and woodland, however, Douglas fir is among the native vegetation. Pilchuck fine sand is a very deep, excessively drained and somewhat excessively drained, rapidly permeable, very slow runoff soil that formed in alluvium. They are found on floodplains at elevations of about 10 to 800 feet above mean sea level on slopes of o to 8 percent. The series is moderately extensive. Pilchuck fine sand is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Benton County, Oregon - Christmas Trees

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Salem, OR (W24232)
Ending Date	December 31, 1983	Meteorological File - Salem, OR (W24232)
Pan Evaporation Factor (PFAC)	0.73	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.16 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Benton County, Oregon - Christmas Trees

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.373 tons EI^{-1*}	Farm Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	0.693.62	Haan and Barfield, 1978
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)

NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	4%	Value set to maximum for crop (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Benton County, Oregon - Christmas Trees

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	2	Set to reside prior to new crop planting; forest floor or meadow.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Salem, OR (W24232)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Set to default for orchards (EPA, 2001)
Maximum Active Root Depth (AMXDR)	120 cm	Roots can exceed 4 feet, http://wwwagcomm.ads.orst.edu/AgComWebfile/EdMat/PNW227.pdf
Maximum Canopy Coverage (COVMAX)	40	Based on aerial photography
Soil Surface Condition After Harvest (ICNAH)	2	Plantation maintained similar to a coniferous forest
Date of Crop Emergence (EMD, EMM, IYREM)	15/04	Value set to mid point of planting date (early - mid Spring) http//pestdata.ncsu.edu/cropprofile/docs/orwachristmastrees.html Value set to mid point of maturing of 7 - 10 year old trees (late summer) Value set to mid-point of harvest date (late October)
Date of Crop Maturity (MAD, MAM, IYRMAT)	15/08	
Date of Crop Harvest (HAD, HAM, IYRHAR)	30/10	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation

SCS Curve Number (CN)	80, 72, 77	Gleams Manual Table A.3, Woodland in poor condition; National Engineering Handbook indicates juniper-grass complexes with loamy texture below surface litter and less than 20 to 25 percent cover have CNs consistent with those selected. (USDA, 1990)
Manning's N Value (MNGN)	0.040	RUSLE Project, A12OFOFN Orchard; Full Cover, No-Till, Moderate cover (35-70% residue cover on soil surface during critical period) (USDA, 2000)
USLE C Factor (USLEC)	0.006 - 0.041	RUSLE Project; A12OFOFN Orchard; Full Cover, No-Till, Moderate cover (35-70% residue cover on soil surface during critical period) (USDA, 2000)

Table 4. PRZM 3.12 Philchuck Soil Parameters for Benton County, Oregon - Christmas Trees

Parameter	Value	Verification Source
Total Soil Depth (CORED)	150 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4 (4th extended to 150 cm)	
First, Second, Third, and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 40 cm (HORIZN = 2) 50 cm (HORIZN = 3,4)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.55 g $\cdot cm^{-3}$ (HORIZN = 1) 1.7 g $\cdot cm^{-3}$ (HORIZN = 2) 1.8 g $\cdot cm^{-3}$ (HORIZN = 3,4)	
Initial Water Content (THETO)	0.123 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.069 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.046 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2.0 cm (HORIZN = 2,3) 5.0 cm (HORIZN = 4)	
Field Capacity (THEFC)	0.123 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.069 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.046 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Wilting Point (THEWP)	0.033 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.019 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.016 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174% (HORIZN = 3) 0.116% (HORIZN = 4)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

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USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

OREGON FILBERTS (HAZELNUTS)

The field used to represent filbert production in Oregon is located in Washington County, in the Willamette Valley. According to the 1997 Census of Agriculture, Oregon is the leading producer of filberts in the U.S. Washington County is the second highest producing county in Oregon. Trees seldom require irrigation. The floor of the groves are kept smooth to permit easy harvesting of the nuts that have fallen to the ground, which occurs from September through November. The soil selected to simulate the field is a Cornelius silt loam. Cornelius silt loam, is a fine-silty, mixed, superactive, mesic Mollic Fragixeralfs. The series is used to produce berries, orchards, small grain and seed crop, hay and pasture. Cornelius silt loam is a moderately deep, moderately well drained, moderately slowly permeable soil with slow to medium runoff. The soil has a fragipan at about 2 feet. These soils formed in silt loess-like materials over mixed, fine-silty old alluvium of mixed origin. They are found on gently sloping to rolling low hills ans steep hill slopes with convex, long slopes and ridgetops at elevation of 350 to

800 feet above mean sea level. Slopes range from 2 to 60 percent. The series is not very extensive. Cornelius silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Washington County, Oregon - Filberts

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Salem, OR (W24232)
Ending Date	December 31, 1983	Meteorological File - Salem, OR (W24232)
Pan Evaporation Factor (PFAC)	0.74	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.2 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Washington County, Oregon - Filberts		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.33 tons EI^{-1*}	Farm Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	3.62	Haan and Barfield, 1978
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	12%	Value set to maximum for crop (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Washington County, Oregon - Filberts		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	3	Set to reside prior to new crop planting; forest floor or meadow.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Salem, OR (W24232)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Set to default for orchards (EPA, 2001)
Maximum Active Root Depth (AMXDR)	90 cm	Set to partial soil series profile depth based on root penetrating the fragipan. Roots may grow to as much as 20 feet.
Maximum Canopy Coverage (COVMAX)	75	Based on aerial photography
Soil Surface Condition After Harvest (ICNAH)	3	Orchards floor maintained similar to a meadow
Date of Crop Emergence (EMD, EMM, IYREM)	05/03	Leaf/flower emergence http://www.orst.edu/dept/hort/orchardnet/ Full Canopy Leaf Fall
Date of Crop Maturity (MAD, MAM, IYRMAT)	15/04	
Date of Crop Harvest (HAD, HAM, IYRHAR)	10/11	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3, meadow; condition good (USDA, 1990)
Manning’s N Value (MNGN)	0.040	RUSLE Project, A13OFOFN for orchards, no-till-Salem, OR (USDA, 2000)
USLE C Factor (USLEC)	0.005 - 0.034	RUSLE Project; A13OFOFN for orchards, no-till-Salem, OR (USDA, 2000)

Table 4. PRZM 3.12 Cornelius Soil Parameters for Washington County, Oregon - Filberts		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	148 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	5	
First, Second, Third, Fourth, and Fifth Soil Horizons (HORIZN = 1,2,3,4,5)		
Horizon Thickness (THKNS)	15 cm (HORIZN = 1,3) 13 cm (HORIZN = 2) 55 cm (HORIZN = 4) 50 cm (HORIZN = 5)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.30 g $\cdot cm^{-3}$ (HORIZN = 1) 1.38 g $\cdot cm^{-3}$ (HORIZN = 2) 1.58 g $\cdot cm^{-3}$ (HORIZN = 3) 1.52 g $\cdot cm^{-3}$ (HORIZN = 4) 1.46 g $\cdot cm^{-3}$ (HORIZN = 5)	
Initial Water Content (THETO)	0.329 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1) 0.338 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =2) 0.340 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.358 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4) 0.202 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =5)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1.0 cm (HORIZN = 2,3) 5.0 cm (HORIZN = 4,5)	
Field Capacity (THEFC)	0.329 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1) 0.338 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =2) 0.340 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.358 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4) 0.202 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =5)	
Wilting Point (THEWP)	0.099 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.108 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2) 0.110 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.148 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4) 0.142 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 5)	
Organic Carbon Content (OC)	2.30% (HORIZN = 1) 1.11% (HORIZN = 2) 0.21% (HORIZN = 3) 0.145% (HORIZN = 4) 0.07% (HORIZN = 5)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

OREGON GRASS FOR SEED

The field used to represent grass for seed production in Oregon is located in Linn County, in the Willamette Valley. According to the 1997 Census of Agriculture, Oregon is ranked 1st in cool season forage and turf grass seed production in the U.S. Most of the acreage is located in the Willamette Valley. Oregon's Willamette Valley produces nearly all the ryegrass, perennial ryegrass, bentgrass, and fine fescue grown in the U.S. The crop is seeded in rows using carbon band seeding to protect the crop during emergence. Seed is planted in the early Fall using specialized equipment to overcome the soil conditions call swampbuggies. The soils tend to be poorly draining which are extensive in the Willamette Valley. Harvest begins in late June or early July. After harvest, field burning is used to control disease prior to the next crop. Field burning remains a controversial practice in the region. The soil selected to simulate the field is a benchmark soil, Dayton silt loam. Dayton silt loam, is a fine, smectitic, mesic Vertic Albaqualfs. The series is used to produce spring grains, grass seed, hay and pasture. A small amount is use for vegetable production. Dayton silt loam is a very deep, poorly drained, very slowly permeable soil with slow runoff or ponded conditions. These soils formed in stratified glacio lacustrine deposits of the Pleistocene age. They are found on nearly level or somewhat concave, slightly depressed parts of broad valley terraces at elevations of 150 to 400 feet above mean sea level on slopes of 0 to 2 percent. The series is extensive in the Willamette Valley. Dayton silt loam is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Marion County Oregon - Grass for Seed

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Salem, OR (W24232)
Ending Date	December 31, 1983	Meteorological File - Salem, OR (W24232)
Pan Evaporation Factor (PFAC)	0.74	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Marion County Oregon - Grass for Seed

Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.43 tons EI^{-1*}	GLEAMS Manual, Table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.173	GLEAMS Manual, Table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1%	Value set to maximum for crop (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)

* EI = 100 ft-tons * in/ acre*hr

Table 3. PRZM 3.12 Crop Parameters for Marion County Oregon - Grass for Seed		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to residue prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Salem, OR (W24232)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM Manual, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	60 cm	http://www.sjrcd.org/ag/effective_root_zone.htm
Maximum Canopy Coverage (COVMAX)	100	Set to full canopy for grasses
Soil Surface Condition After Harvest (ICNAH)	1	Due to field burning, set to conservative input assuming field fallow until next crop.
Date of Crop Emergence (EMD, EMM, IYREM)	15/09	http://www.orst.edu/dept/coarc/obsersty.htm
Date of Crop Maturity (MAD, MAM, IYRMAT)	15/05	Set one weeks before harvest, no specific data available. http://www.css.orst.edu/seed-ext/pub/industry.htm
Date of Crop Harvest (HAD, HAM, IYRHAR)	30/06	http://www.css.orst.edu/seed-ext/pub/industry.htm
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	GLEAMS Table A-3; Meadow; good hydrologic condition (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project; A12WSHLC; Wheat, Spring pnw 40; Conventional tillage, Portland, OR (USDA, 2000)
USLE C Factor (USLEC)	0.026 - 0.459	RUSLE Project; A12WSHLC; Wheat, Spring pnw 40; Conventional tillage, Portland, OR (USDA, 2000)

Table 4. PRZM 3.12 Dayton Soil Parameters for Marion County Oregon - Grass for Seed		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 82 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.4 g $\cdot cm^{-3}$ (HORIZN = 1,2,3)	
Initial Water Content (THETO)	0.312 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.266 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2.0 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.312 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.266 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Wilting Point (THEWP)	0.132 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.236 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	2.32% (HORIZN = 1,2) 0.29% (HORIZN = 3)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

OREGON HOPS

The field used to represent hop production in Oregon is located in Marion County, in the Willamette Valley. According to the 1997 Census of Agriculture, Oregon is ranked 2nd in hop production in the U.S. Marion County leads Oregon in acres planted in 1997. Hops require a rich organic soil, and abundant irrigation for maximum yield. The crop is perennial, old “bines” and other debris are removed in the spring and cultivated until late June or early July. Irrigation begins in May or early June. Harvest occurs from August to mid-September. Row widths vary from about 36 inches to more than 48 inches. The soil selected to simulate the field is a benchmark soil, Woodburn silt loam. Woodburn silt loam, is a fine-silty mixed, superactive, mesic Aquultic Agrixerolls. The series is used to produce berries, orchards, cannery crops, grain, hay, and pasture. Woodburn silt loam is a very deep, moderately well drained, slowly permeable soil with slow to medium runoff. These soils formed in stratified glacio lacustrine deposits of the Pleistocene age. They are found on nearly level to gently sloping broad valley terraces at elevations of 150 to 400 feet above mean sea level on slopes of 0 to 55 percent. The series is extensive in the Willamette Valley. Woodburn silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Marion County Oregon - Hops		
Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Salem, OR (W24232)
Ending Date	December 31, 1983	Meteorological File - Salem, OR (W24232)
Pan Evaporation Factor (PFAC)	0.73	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.16 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Marion County Oregon - Hops		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.32 tons EI^{-1*}	GLEAMS Manual, Table of Representative Soils (USDA, 1985)
USLE LS Factor (USLELS)	0.945	GLEAMS Manual, Table of Representative Soils (USDA, 1985)
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	5%	GLEAMS Manual, Table of Representative Soils; (USDA, 1985)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Marion County, Oregon - Hops		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to residue prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Salem, OR (W24232)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM Manual, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	203 cm	Set to profile maximum. Roots can be as deep as 12 feet (EPA, 2001)
Maximum Canopy Coverage (COVMAX)	90	Professional Estimate based on photography/video
Soil Surface Condition After Harvest (ICNAH)	3	Continuous cultivation
Date of Crop Emergence (EMD, EMM, IYREM)	30/03	http://www.oda.state.or.us/hops/extcr104.html
Date of Crop Maturity (MAD, MAM, IYRMAT)	30/07	
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/09	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3,Meadow, condition good. (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project, A12GCGCM Grapes Alleyway, Mulch Tillage (USDA, 2000)
USLE C Factor (USLEC)	0.294 - 0.522	RUSLE Project; A12GCGCM Grapes Alleyway, Mulch Tillage (USDA, 2000)

Table 4. PRZM 3.12 Woodburn Soil Parameters for Marion County, Oregon - Hops		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	203 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	7 (Top horizon split in two)	
First, Second, Third, Fourth, Fifth, Sixth, and Seventh Soil Horizons (HORIZN = 1,2,3,4,5,6,7)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 13 cm (HORIZN = 2) 20 cm (HORIZN = 3) 40 cm (HORIZN = 4,6) 50 cm (HORIZN = 2) 30 cm (HORIZN = 7)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.44 g $\cdot cm^{-3}$ (HORIZN = 1,2,5) 1.53 g $\cdot cm^{-3}$ (HORIZN = 3) 1.45 g $\cdot cm^{-3}$ (HORIZN = 4) 1.37 g $\cdot cm^{-3}$ (HORIZN = 6,7)	
Initial Water Content (THETO)	0.301 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.350 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.388 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4) 0.394 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =5) 0.418 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =6) 0.404 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =7)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1.0 cm (HORIZN = 2) 2.0 cm (HORIZN = 3,4) 5.0 cm (HORIZN = 5,6) 10.0 cm (HORIZN = 7)	
Field Capacity (THEFC)	0.301 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.350 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.388 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4) 0.394 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =5) 0.418 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =6) 0.404 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =7)	
Wilting Point (THEWP)	0.134 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.153 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.177 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4) 0.185 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 5) 0.173 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 6) 0.156 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 7)	
Organic Carbon Content (OC)	1.86% (HORIZN = 1,2) 0.56% (HORIZN = 3) 0.3% (HORIZN = 4) 0.112% (HORIZN = 5) 0.07% (HORIZN = 6) 0.06% (HORIZN = 7)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research

Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

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USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

OREGON MINT

The field used to represent mint production in Oregon is located in Marion County, in the Willamette Valley. According to the 1997 Census of Agriculture, Oregon is ranked 1st in peppermint production and 4th in spearmint production in the U.S. Marion County is among the top five in harvested acres in the state. Row spacing is from 20 to 30 inches and within row spacing is 4 to 6 inches. Plants spread by the second year to form a solid field of mint. Every 3 to 5 years, growers rotate the mint fields with another crop, generally perennial ryegrass or tall fescue in the Willamette Valley. Mint is mowed once or twice during the summer, depending on the variety. Plants require soils rich in organic matter with a pH range from 6.0 to 7.0. Water demand is high, therefore, irrigation is mandatory for a healthy crop. The soil selected to simulate the field is a Newberg fine sandy loam. Newberg fine sandy loam, is a coarse-loamy, mixed, superactive, mesic Fluventic Haploxerolls. The series is used to produce vegetable, fruit, and pasture. Mint is grown extensively on these soils. Newberg fine sandy loam is a very deep, somewhat excessively drained, moderately rapidly permeable soil with slow runoff. These soils formed in alluvium from sedimentary and basic igneous rocks. They are found on flood plains at elevations of

10 to 3,000 feet above mean sea level on slopes of 0 to 4 percent. The series are of moderate extent. Newberg fine sandy loam is a Hydrologic Group B soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Marion County, Oregon - Mint

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Salem, OR (W24232)
Ending Date	December 31, 1983	Meteorological File - Salem, OR (W24232)
Pan Evaporation Factor (PFAC)	0.74	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	15.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Marion County, Oregon - Mint		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.19 tons EI^{-1*}	Farm Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	0.69	Haan and Barfield, 1978
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	4%	Value set to maximum for crop (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Marion County, Oregon - Mint		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to reside prior to new crop planting; forest floor or meadow.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Salem, OR (W24232)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Set to default for orchards (EPA, 2001)
Maximum Active Root Depth (AMXDR)	30 cm	Gale Gingrich, Marion Co Ag Extension
Maximum Canopy Coverage (COVMAX)	100	Gale Gingrich, Marion Co Ag Extension
Soil Surface Condition After Harvest (ICNAH)	1	Orchards floor maintained similar to a meadow
Date of Crop Emergence (EMD, EMM, IYREM)	15/04	Gale Gingrich, Marion Co Ag Extension
Date of Crop Maturity (MAD, MAM, IYRMAT)	25/07	
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/08	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3, meadow; condition good (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project, A19BSHLC, Medford barley rotated with hay; Salem OR (USDA, 2000)
USLE C Factor (USLEC)	0.019 - 0.381	RUSLE Project; A19BSHLC, Medford barley rotated with hay; Salem OR (USDA, 2000)

Table 4. PRZM 3.12 Newberg Soil Parameters for Marion County, Oregon - Mint		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	150 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	4	
First, Second, Third, and Fourth Soil Horizons (HORIZN = 1,2,3,4)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 40 cm (HORIZN = 2) 25 cm (HORIZN = 3) 75 cm (HORIZN = 4)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.20 g $\cdot cm^{-3}$ (HORIZN = 1,2,3,4)	
Initial Water Content (THETO)	0.308 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.264 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.216 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5.0 cm (HORIZN = 2,3,4)	
Field Capacity (THEFC)	0.308 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.264 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3) 0.216 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =4)	
Wilting Point (THEWP)	0.158 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.114 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3) 0.086 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 4)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.116% (HORIZN = 3) 0.058% (HORIZN = 4)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

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Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

OREGON SWEET CORN

The field used to represent sweet corn production in Oregon is located in Marion County, in the Willamette Valley. According to the 1997 Census of Agriculture, Oregon is ranked 4th in sweet corn for processing. Only a small percent is produced for the fresh market. Marion County farmers harvest the most acres in the state. The crop is generally planted in the early Spring (May) and harvested beginning in September. Continuous sweet corn is practice is much of the region, however, rotation with other crops is practiced as well. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. Conventional tillage dominates, followed by conservation tillage and no-tillage. The crop is rarely grown under irrigation. The soil selected to simulate the field is a benchmark soil, Woodburn silt loam. Woodburn silt loam, is a fine-silty mixed, superactive, mesic Aquultic Agrixerolls. The series is used to produce berries, orchards, cannery crops, grain, hay, and pasture. Woodburn silt loam is a very deep, moderately well drained, slowly permeable soil with slow to medium runoff. These soils formed in stratified glacio lacustrine deposits of the Pleistocene age. They are found on nearly level to gently sloping broad valley terraces at elevations of 150 to 400 feet above mean sea level on slopes of 0 to 55 percent. The series is extensive in the Willamette Valley. Woodburn silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Marion County Oregon - Sweet Corn		
Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Salem, OR (W24232)
Ending Date	December 31, 1983	Meteorological File - Salem, OR (W24232)
Pan Evaporation Factor (PFAC)	0.74	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	15.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Marion County Oregon - Sweet Corn		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.33 tons EI^{-1*}	Farm Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	1.34	Haan and Barfield, 1978
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Value set to maximum for crop (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Marion County, Oregon - Sweet Corn		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to residue prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Salem, OR (W24232)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM Manual, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	PRZM Input Collator, PIC (Burns, 1992); PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	Set to default for row crops (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	1	Crop profile says some are moving to cover crops, grass, instead of wheat- most conservative scenario chosen
Date of Crop Emergence (EMD, EMM, IYREM)	10/05	Dan McGrath, OSU extension agent
Date of Crop Maturity (MAD, MAM, IYRMAT)	21/08	
Date of Crop Harvest (HAD, HAM, IYRHAR)	10/09	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	91, 85, 87	Gleams Manual Table A.3,SR/fallow and SR/Row crops from table H-4 (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, A13CSWWC, Corn, Silage, Conventional Tillage, Salem, OR (USDA, 2000)
USLE C Factor (USLEC)	0.099 - 0.528	RUSLE Project; A13CSWWC, Corn, Silage, Conventional Tillage, Salem, OR (USDA, 2000)

Table 4. PRZM 3.12 Woodburn Soil Parameters for Marion County, Oregon - Sweet Corn		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	203 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	7 (Top horizon split in two)	
First, Second, Third, Fourth, Fifth, Sixth, and Seventh Soil Horizons (HORIZN = 1,2,3,4,5,6,7)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 13 cm (HORIZN = 2) 20 cm (HORIZN = 3) 40 cm (HORIZN = 4,6) 50 cm (HORIZN = 2) 30 cm (HORIZN = 7)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.44 g $\cdot$cm^{-3} (HORIZN = 1,2,5) 1.53 g $\cdot$cm^{-3} (HORIZN = 3) 1.45 g $\cdot$cm^{-3} (HORIZN = 4) 1.37 g $\cdot$cm^{-3} (HORIZN = 6,7)	
Initial Water Content (THETO)	0.301 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =1,2) 0.350 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =3) 0.388 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =4) 0.394 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =5) 0.418 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =6) 0.404 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =7)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1.0 cm (HORIZN = 2) 2.0 cm (HORIZN = 3,4) 5.0 cm (HORIZN = 5,6) 10.0 cm (HORIZN = 7)	
Field Capacity (THEFC)	0.301 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =1,2) 0.350 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =3) 0.388 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =4) 0.394 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =5) 0.418 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =6) 0.404 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =7)	
Wilting Point (THEWP)	0.134 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 1,2) 0.153 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 3) 0.177 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 4) 0.185 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 5) 0.173 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 6) 0.156 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 7)	
Organic Carbon Content (OC)	1.86% (HORIZN = 1,2) 0.56% (HORIZN = 3) 0.3% (HORIZN = 4) 0.112% (HORIZN = 5) 0.07% (HORIZN = 6) 0.06% (HORIZN = 7)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research

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Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

OREGON VEGETABLES (Snapbeans)

The field used to represent snapbean production in Oregon is located in Marion County, in the Willamette Valley. According to the 1997 Census of Agriculture, Oregon is ranked 2nd in common bean production in the U.S. behind Wisconsin, and Marion County growers have the largest acreage. Almost all Oregon beans are processed. The crop is generally planted in the late Spring (June) and harvested beginning in August. After the bean plants have flowered, harvest begins approximately 22 days later. Most commercial farms have replaced pole beans with bush beans to facilitate mechanized harvest. Row spacing is generally 36 inches. The crop is mostly grown under irrigation by a variety of overhead sprinkler systems. The soil selected to simulate the field is a benchmark soil, Dayton silt loam. Dayton silt loam, is a fine, smectitic, mesic Vertic, Albaqualfs. The series is used to produce spring grains, grass seed, hay and pasture. A small amount is use for vegetable production. Dayton silt loam is a very deep, poorly drained, very slowly permeable soil with slow runoff or ponded conditions. These soils formed in stratified glacio lacustrine deposits of the Pleistocene age. They are found on nearly level or somewhat concave, slightly depressed parts of broad valley terraces at elevations of 150 to 400 feet above mean sea level on slopes of 0 to 2 percent. The series is extensive in the Willamette Valley. Dayton silt loam is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Marion County Oregon - Snapbeans

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Salem, OR (W24232)
Ending Date	December 31, 1983	Meteorological File - Salem, OR (W24232)
Pan Evaporation Factor (PFAC)	0.74	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.15 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Marion County Oregon - Snapbeans		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.43 tons EI^{-1*}	GLEAMS Manual, Table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.173	GLEAMS Manual, Table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1%	Value set to maximum for crop (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Marion County Oregon - Snapbeans		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to residue prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Salem, OR (W24232)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM Manual, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	18 cm	PRZM Input Collator, PIC (Burns, 1992); PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	80	PRZM Input Collator (Burns, 1992)
Soil Surface Condition After Harvest (ICNAH)	1	Set to conservative input assuming field fallow until next crop.
Date of Crop Emergence (EMD, EMM, IYREM)	11/06	http://www.orst.edu/Dept/NWREC/snapbean.html
Date of Crop Maturity (MAD, MAM, IYRMAT)	18/08	
Date of Crop Harvest (HAD, HAM, IYRHAR)	02/09	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	92, 89, 90	GLEAMS Table A-3; Close-seeded legumes Fallow = Fallow ST/CT/poor; Cropping and Residue = SR, conventional tillage, poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.011	RUSLE Project; A12BGBGC; Bean, Green, conventional tillage, Portland, OR (USDA, 2000)
USLE C Factor (USLEC)	0.152 - 0.884	RUSLE Project; A12BGBGC; Bean, Green, conventional tillage, Portland, OR (USDA, 2000)

Table 4. PRZM 3.12 Dayton Soil Parameters for Marion County Oregon - Snapbeans		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 82 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.4 g $\cdot cm^{-3}$ (HORIZN = 1,2,3)	
Initial Water Content (THETO)	0.312 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.266 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2.0 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.312 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.266 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Wilting Point (THEWP)	0.132 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.236 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	2.32% (HORIZN = 1,2) 0.29% (HORIZN = 3)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

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OREGON WHEAT (Winter)

The field used to represent wheat production in Oregon is located in the Willamette Valley. According to the 1997 Census of Agriculture, Oregon is ranked 8th in wheat production in the U.S. The crop is generally planted in the Fall (September) and harvested the following year beginning in July. Row spacing ranges from 6 to 9 inches with seeds planted at a depth of 2 inches or less. The soil selected to simulate the field is a benchmark soil, Bashaw clay. Bashaw clay is a very-fine, smectitic, mesic Xeric Endoaquerts. The series is used to produce spring grains which the remainder in natural vegetation. Bashaw clay is a very deep, poorly drained, very slowly permeable soil with an apparent water table at 1 foot above to 0.5 feet below the surface from November to May. Unless protected, flooding is common from December to April. These soils formed in fine textured alluvium. They are found on nearly level or somewhat concave flood plains and terraces and gently sloping fans at elevations of 90 to 1,000 feet above mean sea level on slopes of 0 to 12 percent. The series occur in small bodies and is inextensive in the Willamette Valley. Bashaw clay is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Willamette Valley, Oregon - Wheat

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Salem, OR (W24232)
Ending Date	December 31, 1983	Meteorological File - Salem, OR (W24232)
Pan Evaporation Factor (PFAC)	0.74	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Willamette Valley, Oregon - Wheat		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.13 tons EI^{-1*}	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	1.34	Haan and Barfield, 1978
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	2	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Value set to maximum for crop (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Willamette Valley, Oregon - Wheat		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to residue prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Salem, OR (W24232)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM Manual, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	23 cm	PRZM Input Collator, PIC (Burns, 1992); PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	PRZM Input Collator, PIC (Burns, 1992)
Soil Surface Condition After Harvest (ICNAH)	1	Set to conservative input assuming field fallow until next crop. Residue removed with crop harvest.
Date of Crop Emergence (EMD, EMM, IYREM)	01/09	Emergence based on 15 days from planting; customary planting in OR between Sept 1-15 (USDA, 1984) Maturation based on 220 day average; PRZM Table 5.9 Harvest based on Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	10/03	
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/07	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	92, 89, 90	GLEAMS Table A-3; Close-seeded legumes Fallow = Fallow ST/CT/poor; Cropping and Residue = SR, conventional tillage, poor condition" (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project; A13WWHLC; Winter wheat, conventional tillage, Salem, OR (USDA, 2000)
USLE C Factor (USLEC)	0.017 - 0.336	RUSLE Project; A13WWHLC; Winter wheat, conventional tillage, Salem, OR (USDA, 2000)

Table 4. PRZM 3.12 Bashaw Soil Parameters for Willamette Valley, Oregon - Wheat		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 26 cm (HORIZN = 2) 64 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.3 g $\cdot$cm^{-3} (HORIZN = 1,2,3)	
Initial Water Content (THETO)	0.487 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =1,2) 0.441 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2.0 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.487 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =1,2) 0.441 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =3)	
Wilting Point (THEWP)	0.347 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 1,2) 0.301 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 3)	
Organic Carbon Content (OC)	4.64% (HORIZN = 1,2) 0.29% (HORIZN = 3)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

PENNSYLVANIA ALFALFA

The field used to represent alfalfa production in Pennsylvania is located in York County in south-central Pennsylvania. According to the 1997 Census of Agriculture, Pennsylvania is ranked 15th overall in the production of alfalfa in the U.S. Alfalfa is a perennial crop, grown on a variety of soils, planted early in the year and maintained under continuous cultivation on a 3- to 5-year cycle at which time a new crop is planted. Planting depths range from 0.25 to 1.0 inches, depending on soil texture, on level seed beds. Row spacing is approximately 30 inches; alfalfa is not irrigated in Pennsylvania. Cuttings range from 2 to 4 per year. Most farmers take the last cutting of the season in September. Alfalfa prefers well-drained soils with a pH near neutral (pH 6.7-6.9). The soil selected to simulate the field is a benchmark soil, Glenville silt loam. Glenville silt loam, is a fine-loamy, mixed, active, mesic, Aquic Fragiudults. These soils are in general crop production, but mostly grain, hay and pasture. Glenville silt loam is a very deep, moderately well drained or somewhat poorly drained, medium to slowly permeable soil with medium to slow runoff and consists of a fragipan at approximately 2 feet. In the fragipan, permeability is slow to moderately slow. These soils formed in residuum weathered from mica acid schist and crystalline rock containing mica. They are found on nearly level to strongly sloping upland flats, footslopes, or near the heads of drainageways. Slopes range from 0 to 15 percent. These soils are extensive in the mid-Atlantic Piedmont. Glenville silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for York County, Pennsylvania - Alfalfa		
Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Allentown, PA (W14737)
Ending Date	December 31, 1983	Meteorological File - Allentown, PA (W14737)
Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.3 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	12.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for York County, Pennsylvania - Alfalfa		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.33 tons EI^{-1*}	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	0.123	Haan and Barfield, 1978.
USLE P Factor (USLEP)	0.60	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	12%	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for York County, Pennsylvania - Alfalfa

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to fallow prior to new crop planting.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Allentown, PA (W14737)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	120 cm	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Maximum Canopy Coverage (COVMAX)	100	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Soil Surface Condition After Harvest (ICNAH)	3	Set to residue for winter months after last harvest during multi-year growth and during winter of last years of growth.
Date of Crop Emergence (EMD, EMM, IYREM)	15/04	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Date of Crop Maturity (MAD, MAM, IYRMAT)	31/10	
Date of Crop Harvest (HAD, HAM, IYRHAR)	31/10	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	87, 83, 86	Gleams Manual Table A.3, pasture/range, non-CNT, poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.110	RUSLE Project, SB5HLHLC; Hay, legume, conventional till, York (USDA, 2000)
USLE C Factor (USLEC)	0.001 - 0.017	RUSLE Project; SB5HLHLC; Hay, legume, conventional till, York (USDA, 2000)

Table 4. PRZM 3.12 Glenville Soil Parameters for York County, Pennsylvania - Alfalfa		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	120 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 12 cm (HORIZN = 2) 98 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.4 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.8 g $\cdot cm^{-3}$ (HORIZN = 3)	
Initial Water Content (THETO)	0.254 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.201 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.254 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.201cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.094 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.121 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.74% (HORIZN = 1,2) 0.174 (HORIZN = 3)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

PENNSYLVANIA APPLES

The field used to represent apple production in Pennsylvania is located in Lancaster County, in south-eastern Pennsylvania. According to the 1997 Census of Agriculture, Pennsylvania is ranked 5th in apple production in the U.S. Within row tree spacing depends on the root stock and cultivation method. Spacing ranges from as little as 5 feet to 25 feet. Row spacing may be as much as twice the within row spacing to allow for maintenance and harvesting equipment. The soil selected to simulate the field is a benchmark soil, Elioak silt loam. Elioak silt loam, is a clayey, kaolinitic, mesic, Typic Hapludults. The soil is used for pastures, orchards, general local crops and non-agricultural uses. Elioak silt loam is a very deep, well drained, moderately permeable soil with medium to rapid runoff. These soils formed in residuum weathered from mica schists and phyllites, and to a minor extent from granitized schist and micaeous gneiss. They are found on summits and upper slopes in northern portions of the Piedmont Plateau. Most slopes are less than 15 percent, but can range from 0 to 30 percent. The series is of moderate extent in the mid-Atlantic Piedmont Plateau. Elioak silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Lancaster, PA - Apples		
Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Allentown, PA (W14737)
Ending Date	December 31, 1983	Meteorological File - Allentown, PA (W14737)
Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.2 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Lancaster, PA - Apples		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.42 tons EI^{-1*}	PRZM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	3.60	Haan and Barfield, 1978
USLE P Factor (USLEP)	1.0	PRZM Table 5.6 (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	12%	Value set to maximum for crop (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Lancaster, PA - Apples		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	3	Orchard - material is largely left in place
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Allentown, PA (W14737)
Maximum rainfall interception storage of crop (CINTCP)	0.25	Set to default for orchards (EPA, 2001)
Maximum Active Root Depth (AMXDR)	100 cm	Set to maximum soil depth. Roots may grow to 20 feet.
Maximum Canopy Coverage (COVMAX)	90	http://caf.wvu.edu/kearneyville/fruitloop.html Ross Byers, Horticultural Specialist VPI - canopy somewhat open between rows; 90% reasonable upper end estimate.
Soil Surface Condition After Harvest (ICNAH)	3	Orchards floor maintained similar to a meadow
Date of Crop Emergence (EMD, EMM, IYREM)	20/04	Personal communication w/ Ross Byers, VA Tech Fruit Horticulturalist (540) 869-2560 x19 Emergence based on leaf emergence, Maturation based on canopy maturity, Harvest based on average leaf fall. Dates based on central VA and modified by: 1 day added for every 100 miles north or 100 feet higher elevation or 1day subtracted for every 100 miles south or 100 feet lower elevation.
Date of Crop Maturity (MAD, MAM, IYRMAT)	10/05	
Date of Crop Harvest (HAD, HAM, IYRHAR)	15/10	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	84, 79, 82	Gleams Manual Table A.3, meadow; condition good (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, SB5OBOBC; Orchards, bare ground; conventional tillage; York, PA (USDA, 2000)
USLE C Factor (USLEC)	0.103 - 0.515	RUSLE Project; SB5OBOBC; Orchards, bare ground; conventional tillage; York, PA (USDA, 2000)

Table 4. PRZM 3.12 Elioak Soil Parameters for Lancaster, PA - Apples		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 28 cm (HORIZN = 2) 62 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.70 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.80 g $\cdot cm^{-3}$ (HORIZN = 3)	
Initial Water Content (THETO)	0.218 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.243 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 7 cm (HORIZN = 2) 7.75 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.218 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.243cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.098 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.163 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.174 (HORIZN = 3)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

PENNSYLVANIA CORN

The field used to represent corn production in Pennsylvania is located in Lancaster County in the south-east portion of the state. According to the 1997 Census of Agriculture, Pennsylvania is ranked 15th among major producers of corn in the U.S. The crop is generally planted the Spring (April) and harvested beginning in September. Continuous corn is practice is much of the region. However, rotation with other crops such as soybeans is also practiced. Most of the corn is planted for feed grain. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. Conventional tillage dominates management practices, followed by no-tillage. However, conservation tillage is continuing to grow. The soil selected to simulate the field is a benchmark soil, Hagerstown silt loam. Hagerstown silt loam, is a fine, mixed, semiactive, mesic Typic Hapludalfs. These soils are used fro general crops, pastures, orchards and truck crops. Large portions are in non-farm uses. Hagerstown silt loam is a very deep, well drained, moderately permeable soil with moderate to rapid runoff. These soils formed in materials weathered from hard grey limestone of rather high purity. They are found on valley floors and the adjacent hills. In some areas rock outcrops are common surface features. Slopes are generally less than 15 percent, but may range up to 45 percent. Hagerstown silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Lancaster County, Pennsylvania - Corn		
Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Allentown, PA (W14737)
Ending Date	December 31, 1983	Meteorological File - Allentown, PA (W14737)
Pan Evaporation Factor (PFAC)	0.76	PRZM Manual Figure 5.1 (EPA, 1998.)
Snowmelt Factor (SFAC)	0.20m C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	17.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Lancaster County, Pennsylvania - Corn		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.32 tons EI^{-1*}	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	1.042	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	0.5	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	6%	Maximum value for row crop. (EPA, 2001). Most slopes for soil series are around 2 percent.
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Lancaster County, Pennsylvania - Corn		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set fallow prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Allentown, PA (W14737)
Maximum rainfall interception storage of crop (CINTCP)	0.17	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	PRZM Manual, Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	QA/QC Guidance (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	3	Winter cover crop planted in most areas.
Date of Crop Emergence (EMD, EMM, IYREM)	20/04	Usual Planting and Harvesting Dates for U.S. Field Crops and Penn. State Coop. Extension
Date of Crop Maturity (MAD, MAM, IYRMAT)	04/07	Usual Planting and Harvesting Dates for U.S. Field Crops and Penn. State Coop. Extension
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/10	Usual Planting and Harvesting Dates for U.S. Field Crops and Penn. State Coop. Extension
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	89, 83, 85	Gleams Manual Table A.3, Fallow SR/CT; Cropping and Residue = Row crop, Conservation tillage, Contour plowing" (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, SB5CGSBC, Corn, grain, conventional tillage, York, PA (USDA, 2000)
USLE C Factor (USLEC)	0.025 - 0.701	RUSLE Project; SB5CGSBC, Corn, grain, conventional tillage, York, PA (USDA, 2000)

Table 4. PRZM 3.12 Hagerstown Soil Parameters for Lancaster County, Pennsylvania - Corn		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3	
First, Second, and Third and Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 40 cm (HORIZN = 2) 50 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.6 g $\cdot cm^{-3}$ (HORIZN = 1) 1.7 g $\cdot cm^{-3}$ (HORIZN = 2) 1.8 g $\cdot cm^{-3}$ (HORIZN = 3)	
Initial Water Content (THETO)	0.282 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1) 0.2942cm^3-H_2O $\cdot cm^3$-soil (HORIZN =2) 0.245 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5.0 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.282 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.242cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2) 0.245 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.122 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1) 0.142 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 2) 0.145 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	2.9% (HORIZN = 1) 0.174% (HORIZN = 2) 0.116% (HORIZN = 3)	

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

PENNSYLVANIA VEGETABLES (Tomatoes)

The field used to represent tomato production in Pennsylvania is located in Adams/Lancastrer Counties in Pennsylvania. According to the 1997 Census of Agriculture, Pennsylvania is ranked 6th overall in the production of tomatoes in the U.S. Tomatoes are grown on either six-inch raised beds (20 percent) or on flat beds (80 percent). Tomato plants are transplanted from greenhouse operations. Most tomatoes are planted in late April following the last frost and the harvest may begin in July and last for up to 120 days. Most tomatoes are grown using conventional tillage; less than 2 percent use no-till. Fresh market tomatoes are grown using stakes woven with mesh, individual staking is rare. Growers use black polyethylene mulch (black plastic) for weed control in the beds. Approximately 25 percent of plastic mulch growers use red mulch instead of black. Fresh market growers use trickle irrigation systems. Tomatoes for processing are grown in a similar fashion to fresh market varieties except they are grown on bare ground using overhead drip irrigation; no plastic or stakes are used. Nearly all processed tomatoes are machine harvested. The soil selected to simulate the field is a benchmark soil, Glenville silt loam. Glenville silt loam, is a fine-loamy, mixed, active, mesic, Aquic Fragiudults. These soils are in general crop production, but mostly grain, hay and pasture. Glenville silt loam is a very deep, moderately well drained or somewhat poorly drained, medium to slowly permeable soil with medium to slow runoff and consists of a fragipan at approximately 2 feet. In the fragipan, permeability is slow to moderately slow. These soils formed in residuum weathered from mica acid schist and crystalline rock containing mica. They are found on nearly level to strongly sloping upland flats, footslopes, or near the heads of drainageways. These soils are extensive in the mid-Atlantic Piedmont. Slopes range from 0 to 15 percent. Glenville silt loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Lancaster County, Pennsylvania - Tomatoes

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Allentown, PA (W14737)

Ending Date	December 31, 1983	Meteorological File - Allentown, PA (W14737)
Pan Evaporation Factor (PFAC)	0.75	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.3 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	12.5 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Lancaster County, Pennsylvania - Tomatoes		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.33 tons EI^{-1*}	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	0.123	Haan and Barfield, 1978.
USLE P Factor (USLEP)	0.60	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	3	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	12%	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Hydraulic Length (HL	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Lancaster County, Pennsylvania - Tomatoes		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to fallow prior to new crop planting.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Allentown, PA (W14737)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	120 cm	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Maximum Canopy Coverage (COVMAX)	100	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Soil Surface Condition After Harvest (ICNAH)	3	Set to residue for winter months after last harvest during multi-year growth and during winter of last years of growth.
Date of Crop Emergence (EMD, EMM, IYREM)	15/04	Leon Restler, Ag. Extension Agent, Lancaster Co. (717) 394-6851 8/14/01)
Date of Crop Maturity (MAD, MAM, IYRMAT)	31/10	
Date of Crop Harvest (HAD, HAM, IYRHAR)	31/10	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	87, 83, 86	Gleams Manual Table A.3, pasture/range, non-CNT, poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.110	RUSLE Project, SB5HLHLC; Hay, legume, conventional till, York (USDA, 2000)
USLE C Factor (USLEC)	0.001 - 0.017	RUSLE Project; SB5HLHLC; Hay, legume, conventional till, York (USDA, 2000)

Table 4. PRZM 3.12 Glenville Soil Parameters for Lancaster County, Pennsylvania - Tomatoes

Parameter	Value	Verification Source
Total Soil Depth (CORED)	120 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 12 cm (HORIZN = 2) 98 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.4 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.8 g $\cdot cm^{-3}$ (HORIZN = 3)	
Initial Water Content (THETO)	0.254 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.201 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.254 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.201cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.094 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.121 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.74% (HORIZN = 1,2) 0.174 (HORIZN = 3)	

EPA. 1985. Field Agricultural Runoff Monitoring (FARM) Manual, (EPA/600/3-85/043) Environmental Research Laboratory, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

EPA. 1999. Jones, R.D., J. Breithaupt, J. Carleton, L. Libelo, J. Lin, R. Matzner, and R. Parker. Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington. D.C.

EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

Haan, C.T. and B.J. Barfield. 1978. *Hydrology and Sedimentology of Surface Mined Lands.* Office of Continuing Education and Extension, College of Engineering, University of Kentucky, Lexington, Kentucky 40506. pp. 286.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

TEXAS ALFALFA

The field used to represent alfalfa production in Texas is located in Milam County in the Texas Claypan region. According to the 1997 Census of Agriculture, Texas is not ranked in the top 20 states in production of alfalfa in the U.S. Alfalfa is a perennial crop, grown on a variety of soils, but performs best in Texas on well drained soils with a pH of 6.5. It is planted late in the year (August) and maintained under continuous cultivation on a 3- to 5-year cycle at which time a new crop is planted. Planting depths range from 0.25 to 1.5 inches, depending on soil texture, on level seed beds. Row spacing is approximately 30 inches; approximately 70 percent of the crop is irrigated by sprinkler (55%) and flood (15%). Cuttings range from 3 to 5 per year. Most production is used in state to supply dairies and feedlots. The soil selected to simulate the field is a benchmark soil, Lufkin loam. Lufkin loam, is a fine, smectitic, thermic, Oxyaquic Vertic Paleustalfs. These soils were in general crop production in the past, but are now mostly pasture. Crops currently planted on these soils include grain sorghum, hay crops or small grain for grazing. Lufkin loam is a very deep, moderately well drained, very slowly permeable soil with medium to low runoff depending on slope. The soil has a very slow internal drainage due to the claypan at approximately 12 to 18 inches. The series formed in slightly acid to alkaline clayey sediments at elevations of 75 to 125 feet above major flood plains on slopes of mainly less than one percent, but may range up to 3 percent. The series is extensive in the Texas Claypan region of MLRA 87A and 87B and of to lesser extent in MLRA 86A. Lufkin loam is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Milam County, Texas - Alfalfa

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Austin, TX (W13958)
Ending Date	December 31, 1983	Meteorological File - Austin, TX (W13958)
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.36 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	25 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Milam County, Texas - Alfalfa		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.43 tons EI^{-1*}	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE LS Factor (USLELS)	0.109	GLEAMS Manual, table of Representative Soils (USDA, 1990)
USLE P Factor (USLEP)	1.0	PRZM Manual, Table 5.6 (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	1%	Dominant slope for soil series (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Milam County, Texas - Alfalfa		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to fallow prior to new crop planting.
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Austin, TX (W13958)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	100 cm	Set to soil profile maximum depth. Roots may grow to 20 feet; 8-12 feet is common (EPA, 2001)
Maximum Canopy Coverage (COVMAX)	100	Set to default for row crops (EPA, 2001). Consistent with Ag. Agents from other Alfalfa growing regions.
Soil Surface Condition After Harvest (ICNAH)	3	Set to residue for winter months after last harvest during multi-year growth and during winter of last years of growth.
Date of Crop Emergence (EMD, EMM, IYREM)	30/08	TX generally restricted to Fall plantings. Dates set to mid-points. Emergence 7-10 days after planting; Maturation occurs approximately 60 days after planting.. First harvest after maturation is generally May . Three and sometimes 4 cutting per season. Harvest set to last event assuming 4 cuttings. Each cutting may occur 28-30 days after last. ttp://texaserc.tamu.edu/catalog/topics/Crops.html http://forage.cas.psu.edu/docs/species/alfalfa.html
Date of Crop Maturity (MAD, MAM, IYRMAT)	20/10	
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/08	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	90, 88, 89	Gleams Manual Table A.3, pasture/range, non-CNT, poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.110	RUSLE Project, J94HGHGC; Hay, Grass, conventional tillage, Waco, TX (USDA, 2000)
USLE C Factor (USLEC)	0.000 - 0.004	RUSLE Project; J94HGHGC; Hay, Grass, conventional tillage, Waco, TX (USDA, 2000)

Table 4. PRZM 3.12 Lufkin Soil Parameters for Milam County, Texas - Alfalfa		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 8 cm (HORIZN = 2) 82 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.55 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.6 g $\cdot cm^{-3}$ (HORIZN = 3)	
Initial Water Content (THETO)	0.215 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.320 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2) 2 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.215 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.320cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.105 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.200 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.29 (HORIZN = 3)	

EPA. 1998. Carsel, R.F., J.C. Imhoff, P.R. Hummel, J.M. Cheplick, and A.S. Donigian, Jr. PRZM-3, A Model for Predicting Pesticide and Nitrogen Fate in the Crop Root and Unsaturated Soil Zones: Users Manual for Release 3.0. National Exposure Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Athens, GA.

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EPA. 2001. Abel, S.A. Procedure for Conducting Quality Assurance and Quality Control of Existing and New PRZM Field and Orchard Crop Standard Scenarios. Environmental Fate and Effects Division, Office of Pesticide Programs, U.S. Environmental Protection Agency, Washington, D.C.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and

Agricultural Research Service (ARS).

TEXAS CORN

The field used to represent corn production in Texas is located in Milam County in the Texas Claypan region of the state. According to the 1997 Census of Agriculture, Texas is ranked 11th among major producers of corn in the U.S. The crop is generally planted the early Spring (March) and harvested beginning in September. Continuous corn is practice is much of the region. However, rotation with other crops such as soybeans and wheat is also practiced. Most of the corn is planted for feed grain. Planting depth and row spacing (generally 30 inches) follows general practices for the U.S. Conventional tillage dominates management practices, followed by no-tillage. The soil selected to simulate the field is a benchmark soil, Axtell very fine sandy loam. Axtell very fine sandy loam is a fine, semectitic, thermic Udertic Paleustalfs. These soils were cultivated in the past, but are now in pasture. Some areas are farmed to corn, grain sorghum, or small grain. Axtell very fine sandy loam is a very deep, moderately well drained, very slowly permeable soil with slow to rapid runoff depending on slope. These soils formed in slightly acid to alkaline clayey sediments of the Pleistocene Age. They are found on broad, nearly level to strongly sloping stream terraces and terrace remnants about 50 to 300 feet above the present streams. Slopes are generally 0 to 5 percent, but may range up to 12 percent. Axtell very fine sandy loam is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Milam County, Texas - Corn

Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Austin, TX (W13958)
Ending Date	December 31, 1983	Meteorological File - Austin, TX (W13958)
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.50m C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	25.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Milam County, Texas - Corn		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.31 tons EI^{-1*}	0.31 is consistent with fine sandy loam, as described in official soil description- KJC
USLE LS Factor (USLELS)	0.37	Haan and Barfield, 1978
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	2.5%	Set per QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Milam County, Texas - Corn		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set fallow prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Austin, TX (W13958)
Maximum rainfall interception storage of crop (CINTCP)	0.25	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	90 cm	PRZM Manual, Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	QA/QC Guidance (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	1	Winter cover crop planted in most areas.
Date of Crop Emergence (EMD, EMM, IYREM)	11/03	Usual Planting and Harvesting Dates (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	25/07	Usual Planting and Harvesting Dates (USDA, 1984)
Date of Crop Harvest (HAD, HAM, IYRHAR)	10/09	Usual Planting and Harvesting Dates (USDA, 1984)
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	92, 89, 90	Gleams Manual Table A.3, Fallow = Fallow SR/CT/poor; Cropping and Residue = SR, CT, poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, J94CGWWC; Corn, grain, conventional tillage, Waco (USDA, 2000)
USLE C Factor (USLEC)	0.132 - 0.562	RUSLE Project; J94CGWWC; Corn, grain, conventional tillage, Waco (USDA, 2000)

Table 4. PRZM 3.12 Axtell Soil Parameters for Milam County, Texas - Corn

Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	NRCS, National Soils Characterization Database (NRCS, 2001)
First, Second, and Third and Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1,2) 80 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.6 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.7 g $\cdot cm^{-3}$ (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Initial Water Content (THETO)	0.174 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.235cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5.0 cm (HORIZN = 2,3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Field Capacity (THEFC)	0.174 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.235cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Wilting Point (THEWP)	0.064 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.165 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Organic Carbon Content (OC)	0.58% (HORIZN = 1,2) 0.29% (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)

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TEXAS COTTON

The field used to represent cotton production in Texas is located in Milam County, although cotton is grown throughout Texas. According to the 1997 Census of Agriculture, Texas ranked 1st among the major cotton producing states in the U.S. with more than 5 million acres in production. Most cotton is grown in the High Plains (67%) and Rolling Plains (20%) regions of the state. Cotton is planted in the late winter/early Spring (February and March) in the Lower Rio Grande region and progresses into June in the southern High Plains. Cotton is planted by the “skip-row” or “ultra-narrow row” method. Skip row refers to the technique where every third row is “skipped” to permit the crop to take advantage of soil moisture in semi-arid regions. Ultra-narrow row (UNR) cotton is spaced at 20 inches apart which tends to increase yields and efficiency of productions systems. Both systems require the use of irrigation. Fifty percent of cotton production in the High Plains is irrigated and less than ten percent in the Rolling Plains is irrigated. Furrow irrigation is the most common in the Lower Rio Grande and sprinkler systems are most common in the High Plains. Low Energy Precision Application center pivot irrigation is beginning to make inroad in the area because of its lower pressure requirements, lower evaporation losses and water savings. Row spacing is generally 38-inches with 3-4 plants per foot row in all but UNR cotton. Row canopies tend to be very close to 100 percent, while the canopy between rows is much less. All cotton is defoliated prior to harvesting. Conventional tillage is the dominant practice. The soil selected to simulate the field is a Crockett fine sandy loam. Crockett fine sandy loam is a fine, smectitic, thermic Udertic Paleustalfs. The series is mainly used to grow cotton, grain sorghum, and small grains, but more than half the acreage is now in pasture. Crockett fine sandy loam is a deep, moderately well drained, very slowly permeable soil with low to very high runoff depending on slope. These soils formed in residuum derived from weathered alkaline marine clays, sandy clays, or shale, interbedded with sandier materials mainly of Cretaceous age. They are located on broad nearly level to moderately sloping uplands. Slopes are generally between 1 to 5 percent, but may range from 0 to 10 percent. The series is extensive in MLRA 86, 87A, and 87B. Crockett fine sandy loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for the Milam, County - Cotton		
Parameter	Value	Source
Starting Date	January 1, 1950	Meteorological File - Austin, TX (W13958)
Ending Date	December 31, 1983	Meteorological File - Austin, TX (W13958)
Pan Evaporation Factor (PFAC)	0.7	PRZM Manual Figure 5.1 (EPA, 1998)
Snowmelt Factor (SFAC)	0.3 cm C^{-1}	PRZM Manual Table 5.1.(EPA, 1998)
Minimum Depth of Evaporation (ANETD)	25.0 cm	PRZM Manual Figure 5.2.(EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Milam, County - Cotton		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.3 tons EI^{-1*}	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	0.365	Haan and Barfield, 1978
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA, 1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	2.5%	Selected according to QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Milam, County - Cotton

Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to default for fallow surface prior to planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Austin, TX (W13958)
Maximum rainfall interception storage of crop (CINTCP)	0.2	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	60 cm	PRZM Input Collator, PIC (Burns, 1992); PRZM Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	100	PRZM Input Collator, PIC (Burns, 1992) Per QA/QC Guidance (EPA, 2001)
Soil Surface Condition After Harvest (ICNAH)	3	Residues left on field until following year or cover crop is planted.
Date of Crop Emergence (EMD, EMM, IYREM)	25/04	Personal communication with Cullen ""Dusty"" Tittle, Milam Co. Extension Agent. Maturation and harvest close together because the plants are desiccated anywhere from late Aug through Sept.
Date of Crop Maturity (MAD, MAM, IYRMAT)	15/09	
Date of Crop Harvest (HAD, HAM, IYRHAR)	16/09	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	89, 86, 87	Gleams Manual Table; Fallow = Fallow SR/CT/poor; Cropping and Residue = Row Crop SR/CT/poor (USDA, 1990)
Manning’s N Value (MNGN)	0.023	RUSLE Project, J94CTCTN; Cotton, no-tillage, Waco TX (USDA, 2000)
USLE C Factor (USLEC)	0.111 - 0.365	RUSLE Project; J94CTCTN; Cotton, no-tillage, Waco TX (USDA, 2000)

Table 4. PRZM 3.12 Axtell Soil Parameters for Milam, County - Cotton		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 102 cm (HORIZN = 2) 80 cm (HORIZN = 3)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.6 g $\cdot$cm^{-3} (HORIZN = 1,2) 1.7 g $\cdot$cm^{-3} (HORIZN = 3)	
Initial Water Content (THETO)	0.170 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =1, 2) 0.247 cm^3-H_2O $\cdot$cm^3-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2) 5 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.170 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 1, 2) 0.247 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.06 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 1,2) 0.127 cm^3-H_2O $\cdot$cm^3-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.29% (HORIZN = 3)	

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USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

TEXAS SORGHUM

The field used to represent sorghum production in Texas is located in Milam County in the Texas Claypan region of the state. According to the 1997 Census of Agriculture, Texas is ranked 2nd among major producers of sorghum in the U.S. The crop is generally planted under both dry land and irrigation conditions in the Spring (May), but may extend into July, and harvested beginning in September. Continuous sorghum is practice is much of the region. Row spacing is generally 30 inches for planted systems or in narrow rows of 15 inches in drilled systems. Conservation tillage practices are emphasize for erosion control and include reduced-till, mulch-till, ecofallow, strip-till, ridge-till, zero-till, and no-till. The soil selected to simulate the field is a benchmark soil, Axtell very fine sandy loam. Axtell very fine sandy loam is a fine, semectitic, thermic Udertic Paleustalfs. These soils were cultivated in the past, but are now in pasture. Some areas are farmed to corn, grain sorghum, or small grain. Axtell very fine sandy loam is a very deep, moderately well drained, very slowly permeable soil with slow to rapid runoff depending on slope. These soils formed in slightly acid to alkaline clayey sediments of the Pleistocene Age. They are found on broad, nearly level to strongly sloping stream terraces and terrace remnants about 50 to 300 feet above the present streams. Slopes are generally 0 to 5 percent, but may range up to 12 percent. Axtell very fine sandy loam is a Hydrologic Group D soil.

Table 1. PRZM 3.12 Climate and Time Parameters for Milam County, Texas - Sorghum		
Parameter	Value	Source
Starting Date	January 1, 1948	Meteorological File - Austin, TX (W13958)
Ending Date	December 31, 1983	Meteorological File - Austin, TX (W13958)
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998.)
Snowmelt Factor (SFAC)	0.36m C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	25.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for Milam County, Texas - Sorghum		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.43 tons EI^{-1*}	GLEAMS Manual; Representative Soils USDA (1990)
USLE LS Factor (USLELS)	0.402	GLEAMS Manual; Representative Soils USDA (1990)
USLE P Factor (USLEP)	1.0	Set according to guidance (EPA, 2001)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	4	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	2.5%	Set per QA/QC Guidance (EPA, 2001)
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for Milam County, Texas - Sorghum		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set fallow prior to new crop planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Austin, TX (W13958)
Maximum rainfall interception storage of crop (CINTCP)	0.1	PRZM, Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	22 cm	PRZM Manual, Table 5.9 (EPA, 1998)
Maximum Canopy Coverage (COVMAX)	85	PRZM Input Collator, PIC (Burns, 1992)
Soil Surface Condition After Harvest (ICNAH)	1	Default (EPA, 2001)
Date of Crop Emergence (EMD, EMM, IYREM)	11/05	Usual Planting and Harvesting Dates (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	12/09	Usual Planting and Harvesting Dates (USDA, 1984)
Date of Crop Harvest (HAD, HAM, IYRHAR)	22/09	Usual Planting and Harvesting Dates (USDA, 1984)
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	92, 86,87	Gleams Manual Table A.3,Fallow SR/CT/poor; Cropping and Residue = small grain, SR/CT, poor condition (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, J94SGSGC; Sorghum grain, conventional tillage, Waco TX (USDA, 2000)
USLE C Factor (USLEC)	0.050 - 0.704	RUSLE Project; J94SGSGC; Sorghum grain, conventional tillage, Waco TX (USDA, 2000)

Table 4. PRZM 3.12 Axtell Soil Parameters for Milam County, Texas - Sorghum		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third and Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1,2) 80 cm (HORIZN = 3)	NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.6 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.7 g $\cdot cm^{-3}$ (HORIZN = 3)	
Initial Water Content (THETO)	0.174 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1,2) 0.235cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 5.0 cm (HORIZN = 2,3)	
Field Capacity (THEFC)	0.174 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.235cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.064 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.165 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	0.58% (HORIZN = 1,2) 0.29% (HORIZN = 3)	

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USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version

1.8.55. USDA-ARS Southeast Watershed Research Laboratory, Tifton GA. SEWRL-030190FMD.

USDA. 2000. Revised Universal Soil Loss Equation (RUSLE) EPA Pesticide Project. U.S. Department of Agriculture, National Resources Conservation Service (NRCS) and Agricultural Research Service (ARS).

TEXAS WHEAT (Winter)

The field used to represent wheat production in Texas is located in the Blacklands region, however, wheat is grown throughout Texas. According to the 1997 Census of Agriculture, Texas ranked 7th among the major wheat producing states in the U.S. with more than 2.5 million acres in production. Most wheat is grown in the High Plains region of the state. Wheat is planted in the early fall (mid-September through October) and harvested in the summer. Row spacing ranges from 6 to 9 inches with seeds planted at a depth of 2 inches or less. The soil selected to simulate the field is a Crockett fine sandy loam. Crockett fine sandy loam is a fine, smectitic, thermic Udertic Paleustalfs. The series is mainly used to grow cotton, grain sorghum, and small grains, but more than half the acreage is now in pasture. Crocket fine sandy loam is a deep. Moderately well drained, very slowly permeable soil with low to very high runoff depending on slope. These soils formed in residuum derived from weathered alkaline marine clays, sandy clays, or shale, interbedded with sandier materials mainly of Cretaceous age. They are located on broad nearly level to moderately sloping uplands. Slopes are generally between 1 to 5 percent, but may range from 0 to 10 percent. The series is extensive in MLRA 86, 87A, and 87B. Crockett fine sandy loam is a Hydrologic Group C soil.

Table 1. PRZM 3.12 Climate and Time Parameters for the Blacklands, Texas - Wheat

Parameter	Value	Source
Starting Date	January 1, 1950	Meteorological File - Austin, TX (W13958)
Ending Date	December 31, 1983	Meteorological File - Austin, TX (W13958)
Pan Evaporation Factor (PFAC)	0.71	PRZM Manual Figure 5.1 (EPA, 1998.)
Snowmelt Factor (SFAC)	0.5 cm C^{-1}	PRZM Manual Table 5.1 (EPA, 1998)
Minimum Depth of Evaporation (ANETD)	10.0 cm	PRZM Manual Figure 5.2 (EPA, 1998)

Table 2. PRZM 3.12 Erosion and Landscape Parameters for the Blacklands, Texas - Wheat		
Parameter	Value	Source
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Manual (EPA, 1998)
USLE K Factor (USLEK)	0.43 tons EI^{-1*}	FARM Manual, Table 3.1 (EPA, 1985)
USLE LS Factor (USLELS)	0.103365	Haan and Barfield, 1978
USLE P Factor (USLEP)	1.00	PRZM Manual (EPA,1998)
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (EPA, 1999)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	3%	consultation with Tom Gerik (254.774.6128) most highly erodible soils with slopes >5% in Blacklands area have been put into CRP or pasture. Wheat is mostly grown on soils with slopes 1-3%; the best wheat soils are Houston clay or Austin.
Hydraulic Length (HL)	600 m	Shipman Reservoir (EPA, 1999)
* EI = 100 ft-tons * in/ acre*hr		

Table 3. PRZM 3.12 Crop Parameters for the Blacklands, Texas - Wheat		
Parameter	Value	Source
Initial Crop (INICRP)	1	Set to one for all crops (EPA, 2001)
Initial Surface Condition (ISCOND)	1	Set to default for fallow surface prior to planting
Number of Different Crops (NDC)	1	Set to crops in simulation - generally one
Number of Cropping Periods (NCPDS)	36	Set to weather data. Austin, TX (W13958)
Maximum rainfall interception storage of crop (CINTCP)	0.2	PRZM Table 5.4 (EPA, 1998)
Maximum Active Root Depth (AMXDR)	110 cm	Consultation with Tom Gerik (254-774-6128)
Maximum Canopy Coverage (COVMAX)	99	Tom Gerik (254-774-6128)
Soil Surface Condition After Harvest (ICNAH)	3	Tom Gerik (254-774-6128), winter wheat in Blacklands area is harvested from mid-May to early June. The earliest repeat crop is the following spring. The stubble is left alone until mid to late summer, when it is disked once in August/September.
Date of Crop Emergence (EMD, EMM, IYREM)	10/10	Usual Planting and Harvesting Dates for U.S. Field Crops (USDA, 1984)
Date of Crop Maturity (MAD, MAM, IYRMAT)	30/04	
Date of Crop Harvest (HAD, HAM, IYRHAR)	17/06	
Maximum Dry Weight (WFMAX)	0.0	Set to “0" Not used in simulation
SCS Curve Number (CN)	94, 87, 88	Gleams Manual Table; Fallow = Fallow SR/poor; Cropping and Residue = Small grain SR/good (USDA, 1990)
Manning’s N Value (MNGN)	0.014	RUSLE Project, J94CTCTN; Cotton, no-tillage, Waco TX (USDA, 2000)
USLE C Factor (USLEC)	0.026 - 0.318	RUSLE Project; J94CTCTN; Cotton, no-tillage, Waco TX (USDA, 2000)

Table 4. PRZM 3.12 Axtell Soil Parameters for the Blacklands, Texas - Wheat		
Parameter	Value	Verification Source
Total Soil Depth (CORED)	100 cm	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001)
Number of Horizons (NHORIZ)	3 (Top horizon split in two)	
First, Second, and Third Soil Horizons (HORIZN = 1,2,3)		
Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 10 cm (HORIZN = 2) 80 cm (HORIZN = 3)	PIC (Burns, 1992) Confirmed with: NRCS, National Soils Characterization Database (NRCS, 2001) http://www.statlab.iastate.edu/soils/ssl/)
Bulk Density (BD)	1.6 g $\cdot cm^{-3}$ (HORIZN = 1,2) 1.7 g $\cdot cm^{-3}$ (HORIZN = 3)	
Initial Water Content (THETO)	0.170 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =1, 2) 0.247 cm^3-H_2O $\cdot cm^3$-soil (HORIZN =3)	
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 1 cm (HORIZN = 2) 5 cm (HORIZN = 3)	
Field Capacity (THEFC)	0.170 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1, 2) 0.247 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Wilting Point (THEWP)	0.06 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 1,2) 0.127 cm^3-H_2O $\cdot cm^3$-soil (HORIZN = 3)	
Organic Carbon Content (OC)	1.16% (HORIZN = 1,2) 0.29% (HORIZN = 3)	

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