Southern California
Outdoor Ornamental Nursery Scenario

This scenario is one of a suite of scenarios intended to represent outdoor ornamental nursery scenarios in the United States. It should be noted that nurseries are diverse and represent a range of topographic, cultivation, and plant types. Scenarios, when possible have been developed to represent conservative nursery practices that will yield "high-end" runoff, but not unrealistic of actual nurseries in the area. Similarly, selection of curve numbers are based on best available data from TR-55 until further calibration can be performed using regional runoff data, which at the time of scenario development is generally unavailable for nurseries. Figure 1 provides an overview of available curve numbers from TR-55 in order to provide context to the relative magnitude of the curve number used in this scenario. The closest curve number that could be associated with outdoor nurseries is for "farmsteads", due to similar cover conditions. Curve numbers are generally among the highest available, exceeded primarily by soils in poor condition.

This scenario is parameterized to generally represent outdoor ornamental nursery production in southern California. The scenario nominally represents outdoor ornamental nurseries in San Diego County, CA since it is the county with the most number of acres in production in the region. In 2002, the state of California ranked number 1 in the U.S. for total number of ornamental nursery acres in the outdoors (i.e., not under glass), with nearly 52,000 acres in the open (USDA 2002a). San Diego County ranks number 1 in the state with approximately 10,139 acres of outdoor nurseries in the county according to the 2002 USDA census of agriculture (USDA 2002a). The total value of agricultural products sold in San Diego County in 2002 was approximately 950 million dollars, of which approximately 65% of the revenue was generated from the sale of nursery and greenhouse crops (and sod) (USDA 2002b). San Diego County is primarily within MLRA's 19 and 20.

Plants cultivated by outdoor nurseries are diverse. For this scenario, crop parameters have been selected when possible to be representative of typical outdoor nursery practices in southern California. Based on local expert information as well as nursery production and pesticide application data, this scenario has been parameterized to represent outdoor container nurseries producing fruit and nut trees. Nurseries in southern California are primarily wholesale (J. Bethke, personal communication) and are typically container operations (C. Wilen, personal communication). According to the USDA 2003 nursery crops summary (USDA, 2004a), the most commonly produced nursery plants in California are fruit and nut trees (33 million plants) and deciduous shrubs (27 million plants). In addition, fruit and nut trees receive approximately 66 thousand pounds of pesticide active ingredient per year (USDA, 2004b). In 2003, the majority (52%) of fruit and nut trees in California were sold in containers. Lesser amounts were sold as bare-root and balled-&-burlapped. Irrigation is often used. Methods are primarily drip irrigation and most nurseries have on site irrigation specialists (J. Bethke, personal communication).

Metfile W23188 is located in San Diego, CA and is the closest meteorological station to San Diego County, CA. It is within approximately 28 miles of the county centroid. Its data were collected in San Diego, CA located in the south-western part of the state. The station is located approximately 4 meters above mean sea level (AMSL). Although San Diego County is mountainous with elevations ranging from near sea level to over 3,000 feet AMSL, the San Diego station is expected to be the most representative climate station in the area. The next closest station is Long Beach located approximately 100 miles from the scenario and is also approximately 4 meters AMSL. San Diego receives an average rainfall of 10.8 inches (NOAA, 2006). San Diego County's climate is arid and irrigation is required year-round (Jim Bethke, personal communication)

Nursery soils in southern California are commonly sandy loams (Jim Bethke, personal communication). Exact locations and geographic extent of nurseries in the region are not available; therefore soils were selected based on soil recommendations of local experts, the geographic extent of nursery supporting soils in the area, the drainage group, slope, and erodibility. The Cieneba series was selected for this scenario since it is a sandy loam, is of large extent in the region (USDA, 1999; 2006), and is a hydrologic group C soil (Table 5).

The Cieneba series consists of very shallow and shallow, somewhat excessively drained soils that formed in material weathered from granitic rock (USDA, 1999). Cieneba is a Hydrologic Group C soil, which represents approximately 17% of the soils in San Diego County (Table 5). Cieneba soils have a USLE K factor ranging from 0.24 to 0.32, which is common among soils in San Diego County. Six soils have a USLE K greater than 0.32, however these soils are significantly less extensive than Cieneba and are not sandy loams which are typical of nurseries in the area (Jim Bethke, personal communication). Approximately 9% of San Diego County soils have a pH range lower than Cieneba soils. Based on the official soil series description, Ceineba soils have an A horizon from 0 to 10 inches (0-25 cm) deep and a C horizon from 10 to over 30 inches (25-76 cm) deep (USDA, 2006). Soil parameters are based on "Cieneba coarse sandy loam, 15 to 30 percent slopes" soils based on typical nursery soils and slope range up to 35 degrees (Jim Bethke, personal communication).

Version 2 of this scenario includes corrected parameter values that replace values outside of the ranges that PRZM is designed to accept. The corrections include setting AMXDR and CORED equal to ANETD (*i.e.*, 32.5 cm).

Table 1. PRZM 3.12 Climate and Time Parameters for Southern California – Ornamental Nurseries.		
Parameter	**Value**	**Source/Comments**
Starting Date	Jan. 1, 1961	Meteorological File San Diego, CA (W23188)
Ending Date	Dec. 31, 1990	Meteorological File San Diego, CA (W23188)
Pan Evaporation Factor (PFAC)	0.7	PRZM Manual Figure 5.1. Value represents the center of San Diego county.
Snowmelt Factor (SFAC)	0	PRZM Manual guidance. No snowfall observed at San Diego Lindbergh Field (NOWData, NOAA).

Minimum Depth of Evaporation (ANETD)	32.5 cm	PRZM Manual Figure 5.2 (EPA, 1998) Set to guidance default for free draining soils.

Table 2. PRZM 3.12 Erosion and Landscape Parameters for San Diego County, California – Ornamental Nurseries.

Parameter	Value	Source/Comments
Method to Calculate Erosion (ERFLAG)	4 (MUSS)	PRZM Guidance (EPA, 2004)
USLE K Factor (USLEK)	0.32	USDA NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/) Value listed for the soil series Cieneba coarse sandy loam.
USLE LS Factor (USLELS)	10.3	LS equation (Haan and Barfield, 1978) LS value for 22.5 % slope and 400' slope length
USLE P Factor (USLEP)	1.0	Set to 1 for orchards as per PRZM Scenario Guidance (EPA, 2004).
Field Area (AFIELD)	172 ha	Area of Shipman Reservoir watershed (PRZM Guidance, EPA, 2004)
NRCS Hyetograph (IREG)	1	PRZM Manual Figure 5.12 (EPA, 1998)
Slope (SLP)	22.5%	A good portion of the outdoor production is on hillsides with as much as a 35 degree slope (J. Bethke, UC Cooperative Extension), but few pesticides are used on steep slopes. Therefore, mid-point for the soil series Cieneba coarse sandy loam (15-30%) was selected. USDA NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/). PRZM Scenario Guidance (EPA, 2004).
Hydraulic Length (HL)	600 m	Shipman Reservoir (PRZM Guidance, EPA, 2004)
Irrigation Flag (IRFLAG)	1	Year-round irrigation. C. Wilen (UCCE)
Irrigation Type (IRTYP)	4 (drip)	Methods are primarily drip irrigation and most nurseries have on site irrigation specialists (J. Bethke, personal communication). Irrigation Guidance for developing PRZM Scenario, Table 3; (June 15, 2005); and C. Wilen (UCCE).
Leaching Factor (FLEACH)	0	Default value. Irrigation Guidance for developing PRZM Scenario, Table 3; (June 15, 2005).
Fraction of Water Capacity when Irrigation is Applied (PCDEPL)	0.5	Default value. Irrigation Guidance for developing PRZM Scenario, Table 3; (June 15, 2005).
Maximum Rate at which Irrigation is Applied (RATEAP)	0.46	Default value. Irrigation Guidance for developing PRZM Scenario, Table 1; (June 15, 2005). Set based on f= 0 and cropping curve number of 82.

Table 3. PRZM 3.12 Crop Parameters for San Diego County, California – Ornamental Nurseries.

Parameter	Value	Source/Comments
Initial Crop (INICRP)	1	Default value
Initial Surface Condition (ISCOND)	1	1 = fallow. Many nurseries lay down gravel under the containers. J. Bethke, UC Cooperative Extension, Farm Advisor-Nurseries and Floriculture. This condition is more representative of fallow.
Number of Different Crops (NDC)	1	Set to number of crops in simulation. Default value.
Number of Cropping Periods (NCPDS)	30	Set to weather data in meteorological file: San Diego, CA (W23188)

Table 3. PRZM 3.12 Crop Parameters for San Diego County, California – Ornamental Nurseries.

Parameter	Value	Source/Comments
Maximum rainfall interception storage of crop (CINTCP)	0.1	Table 5-4 PRZM manual, light density crops (EPA, 1998).
Maximum Active Root Depth (AMXDR)	32.5 cm	The majority of southern California's nursery operations are containerized (C. Wilen, UC Cooperative Extension, IPM advisor for Ornamental Nurseries). However, this value was set to equal the minimum depth of evaporation (ANETD).
Maximum Canopy Coverage (COVMAX)	60%	Based on high-resolution color aerial photography of ornamental nurseries in San Diego County.
Maximum Canopy Height (HTMAX)	183 cm (6ft)	Height varies widely as many different cultivars are grown. Value selected to represent typical fruit or nut tree at sale.
Soil Surface Condition After Harvest (ICNAH)	1	1 = fallow. Many nurseries lay down gravel under the containers. J. Bethke, UC Cooperative Extension, Farm Advisor-Nurseries and Floriculture. This condition is more representative of fallow.
Date of Crop Emergence (EMD, EMM, IYREM)	01/03/61	James Bethke, UC Cooperative Extension, Farm Advisor-Nurseries and Floriculture. Values are set to keep E/T and canopy coverage terms working correctly for this deciduous scenario. Set to typical leaf bloom dates (March 1). Adjusted to the nearest corresponding RUSLE date (RUSLE Project; C25CBCBC).
Date of Crop Maturity (MAD, MAM, IYRMAT)	01/04/61	Values are set to keep E/T and canopy coverage terms working correctly for this deciduous scenario. Set to 1 month post leaf bloom.
Date of Crop Harvest (HAD, HAM, IYRHAR)	01/11/61	James Bethke, UC Cooperative Extension, Farm Advisor-Nurseries and Floriculture. Values are set to keep E/T and canopy coverage terms working correctly for this deciduous scenario. Set to typical leaf-off dates.
Maximum Dry Weight (WFMAX)	0.0	Not used in scenario
SCS Curve Number (CN)	82, 82, 87	TR-55, Table 2-2c (USDA 1986). Value for farmsteads, buildings, lanes, driveways, and surrounding lots. Hydrologic Group C. Third curve number represents a cleared condition similar to a gravel road.
Manning's N Value (MNGN)	0.014	RUSLE Project; C25CBCBC for San Diego, CA orchards with conventional till and no cover (cover code 6). These data were used to approximate values for nurseries in southern California as no data for ornamental nurseries were included in the project.
USLE C Factor (USLEC)	0.252 - 0.368	RUSLE Project; C25CBCBC for San Diego, CA orchards with conventional till and no cover (cover code 6). These data were used to approximate values for nurseries in southern California as no data for ornamental nurseries were included in the project. Note: RUSLE dates and C factors from the RUSLE project have been reordered and tied to emergence dates.

Table 4. PRZM 3.12 Cieneba Coarse Sandy Loam Soil Parameters for San Diego County, California – Ornamental Nurseries

Parameter	Value	Source/Comments
Total Soil Depth (CORED)	32.5 cm	This value was set to equal the minimum depth of evaporation (ANETD).
Number of Horizons (NHORIZ)	2	NRCS Soil Data Mart (SDM) (http://soildatamart.nrcs.usda.gov). The third horizon from SDM was excluded because it is bedrock.

Horizon Thickness (THKNS)	10 cm (HORIZN = 1) 22.5 cm (HORIZN = 2)	NRCS Soil Data Mart (SDM) (http://soildatamart.nrcs.usda.gov). The second horizon set according to the total soil depth (CORED).
Bulk Density (BD)	1.55 g/cm^3 (HORIZN = 1) 1.55 g/cm^3 (HORIZN = 2)	NRCS Soil Data Mart (SDM) (http://soildatamart.nrcs.usda.gov). Midpoint of the reported range. PRZM Scenario Guidance (EPA, 2004).
Initial Water Content (THETO)	0.168 cm^3/cm^3 (HORIZN =1) 0.168 cm^3/cm^3 (HORIZN =2)	NRCS Soil Data Mart (SDM); values are mean 1/3-bar water contents of Cieneba coarse sandy loam soils.
Compartment Thickness (DPN)	0.1 cm (HORIZN = 1) 2.5 cm (HORIZN = 2)	NRCS Soil Data Mart (SDM) (http://soildatamart.nrcs.usda.gov). PRZM Scenario Guidance (EPA, 2004). The second horizon set according to the horizon thickness (THKNS).
Field Capacity (THEFC)	0.168 cm^3/cm^3 (HORIZN =1) 0.168 cm^3/cm^3 (HORIZN =2)	NRCS Soil Data Mart (SDM); values are mean 1/3-bar water contents of Cieneba coarse sandy loam soils.
Wilting Point (THEWP)	0.08 cm^3/cm^3 (HORIZN =1) 0.08 cm^3/cm^3 (HORIZN =2)	NRCS Soil Data Mart (SDM); values are mean 15-bar water contents of Cieneba coarse sandy loam soils.
Organic Carbon Content (OC)	0.44 % (HORIZN = 1) 0.44 % (HORIZN = 2)	NRCS SDM; values for horizons 1 to 3 = mean %OM / 1.724. PRZM Scenario Guidance (EPA, 2004).

Sensitive Parameter Uncertainties

Meteorological File

As characterized above, Metfile W23188 (San Diego, CA) is the closest metfile to San Diego County, which was used to represent this scenario. The metfile is located approximately 28 miles from the center of San Diego County and is generally representative of the area. However, the terrain is mountainous and elevations vary widely. The metstation is located near sea level (4 meters AMSL). Rainfall in southern California may be over or underestimated by this station due to terrain and orographic effects. A sensitivity analysis of meteorological stations in the surrounding region would reduce uncertainty in the PRZM results.

Slope

The scenario USLELS value was calculated with the Haan and Barfield equation (1978) using a 22.5% slope and an assumed 400-foot slope length, as per PRZM scenario development guidance (EPA, 2004). Nurseries in southern California are sometimes located on hillsides with as much as a 35 degree slope (J. Bethke, UC Cooperative Extension), but few pesticides are used on steep slopes. Therefore, mid-point for the soil series Cieneba coarse sandy loam (15-30%) was selected based on PRZM Scenario Guidance (EPA, 2004). This scenario may underestimate runoff and erosion for nurseries located on slopes greater than 22.5%

USLE C Factor and Manning's N Value

The RUSLE Project does not include data for ornamental nursery crops. Therefore, USLE C Factor and Manning's N values were selected from data on California orchards conventional till and no cover. This involves some uncertainty since many nurseries create a surface layer of gravel or cloth. Of the available locations, San Diego California has the most similar meteorological conditions and no cover as this scenario.

Soil Data

No geospatial data were available to determine the exact locations and geographic extent of nurseries in the region. The USGS GIRAS Landuse/Landcover data (EPA, 1994) for the Conterminous United States includes a nurseries classification; however the data are generally 25 years old at the time of this scenario development and preliminary review of the data indicates that nurseries are not well represented. This is likely due to the resolution of the data (30 m) and age of the data set (based on 1970's and 80's imagery). As a result, soils were selected based on soil recommendations of local experts, the geographic extent of the listed soils in the area, the drainage group, slope, and erodibility. The soil selected is a hydrologic group C soil.

Crop Parameters

Outdoor ornamental nurseries are highly diverse in the numbers, sizes, and types of plants grown. Ornamental nurseries also vary in the cultivation methods which can range from potted plants (container operations) to field nurseries that may harvest and package plants as bare root or balled and burlapped. This scenario has been parameterized to be representative of the most "typical" nursery plants in the area (see description above). Runoff and erosion may be over or underestimated depending on the type of nursery modeled and a sensitivity analysis has high value in this regard.

Curve Number

The curve number is the most sensitive parameter in PRZM scenarios. The curve number for this scenario was based on TR-55 (Table 2-2c). Nurseries can be covered in roads, wooded areas, field borders, and buildings. Therefore the curve number closest to this scenario was the value for a hydrologic group C soil representative of farmsteads, buildings, lanes, driveways, and surrounding lots. Runoff and erosion may be under or over-estimated for alternative nursery operations and model validation has high value in this regard. Based on preliminary investigation, no runoff data are available for validating runoff from outdoor nursery operations in this geographic area.
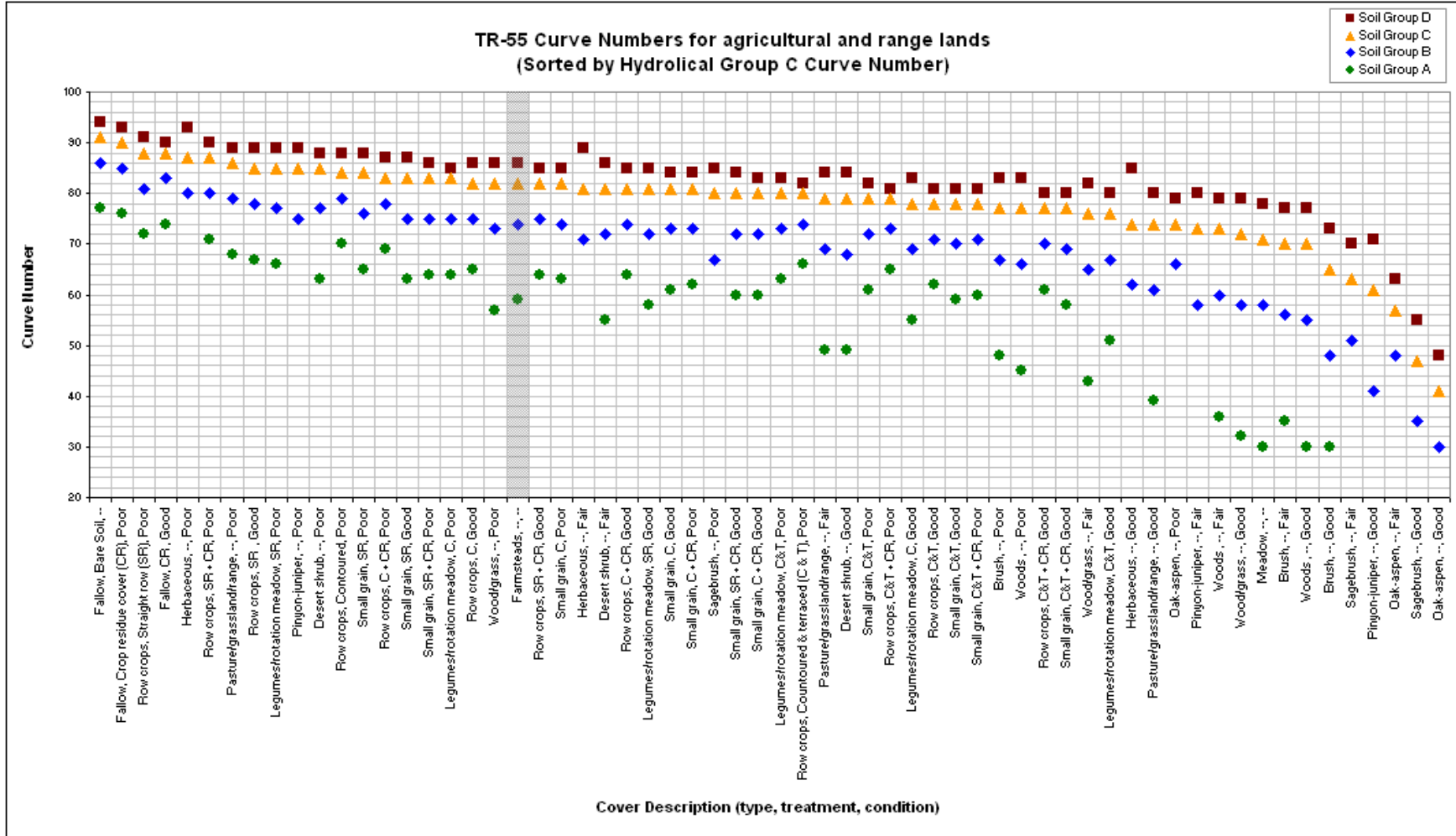
Figure 1. TR-55 (USDA, 1986) Farmstead curve number used for scenario development relative to other available cover types, soil treatments, and conditions.

Table 5. Soils of San Diego County, California Ranked by Area[a,b]. Includes Soils Comprising Greater than 1% of Total Soil Acres.

Soil	Total Acres	% Area	Hydrologic Group	Erodibility	Slope	pH	OM	Sand	Silt	Clay
CIENEBA	332986	16.5%	C	0.24-0.32	9-75	5.8-6.5	0.75	67.9-68.5	19-19.6	12.5
TOLLHOUSE	131885	6.5%	D	0.24	9-65	6.7	1.5	65.2	23.3	11.5
FALLBROOK	127959	6.3%	B	0.24-0.28	2-50	6.1-6.7	0.75-1.25	65.9-68.8	16.2-19.6	13-15
SHEEPHEAD	106947	5.3%	C	0.17	9-65	6.3	2	63.5	26.5	10
LA POSTA	106823	5.3%	B	0.17	5-65	6.7	2	81.9	10.6	7.5
LAS POSAS	85559	4.2%	C	0.32	2-65	7	0.75	63.1	19.4	17.5
REDDING	66957	3.3%	D	0.32	2-50	5.6	1.25	43	39.5	17.5
VISTA	62783	3.1%	B	0.24-0.28	5-65	6.7	0.75-1.25	65.4-66.8	22.2-23.6	11
CROUCH	61952	3.1%	B	0.17-0.2	8-75	6.3	2	63.9-66.5	24-26.6	9.5
HUERHUERO	53158	2.6%	D	0.37	2-30	5.6	1.5	42.1	37.9	20
SAN MIGUEL	52442	2.6%	D	0.64	9-30	5.6	0.75	30.1	54.9	15
DIABLO	47441	2.4%	D	0.17	2-50	7.2	2	22.1-23.3	27.9-29.2	47.5-50
ROSITAS	46567	2.3%	A	0.17-0.24	0-15	8.2	0.25	80.2-96.8	0.7-17.3	2.5
BANCAS	45751	2.3%	B	0.24	5-65	6.7	1.5-2	42.1	37.9	20
VISALIA	45088	2.2%	B	0.2	0-15	6.3	2.5	67.4	19.6	13
HOLLAND	44735	2.2%	B/C	0.24	2-60	5.8	3	62.8-66.1	19.9-26.2	11-14
FRIANT	43688	2.2%	D	0.2	9-70	6.3	1.5	66.1	19.9	14
MOTTSVILLE	42838	2.1%	A/D	0.24	0-15	6.3	2	82.8	10.7	6.5
OLIVENHAIN	41806	2.1%	D	0.32-0.37	2-50	5.8	0.75	42.1	37.9	20
LAS FLORES	32818	1.6%	D	0.37	2-30	6.1	0.75	86.8	6.7	6.5
CARRIZO	30347	1.5%	A	0.24	0-9	7.9	0.25	96	1.5	2.5
PLACENTIA	30231	1.5%	D	0.37	0-15	6.1	1.25	65.1	18.9	16
TUJUNGA	27553	1.4%	A	0.15	0-5	7	0.75	96	1.5	2.5
RAMONA	26131	1.3%	B	0.37	0-30	6.1	0.75	68.5	24	7.5
RIVERWASH	22131	1.1%	D	0.1-0.17	0-5	-	0.05	92.9-97.9	1.6-6.6	0.5

Notes:
[a] pH, OM, Sand, Silt, and Clay are based on representative values from USDA Soil Data Mart.
[b] Table excludes soils less than 1% of total soil area. Areas such as gravel pits, urban land, lagoons, etc were not included in the % area computations. Also excludes areas not yet complete in soil data mart.

Literature Cited

EPA. 1994. Environmental Protection Agency's (EPA) Office of Information Resources Management (OIRM), 1994, GIRAS Landuse/Landcover data for the Conterminous United States by quadrangles at scale 1:250,000.

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, DC.

EPA. 2004. 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, DC. Revised 2004.

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 KY 40506. pp 286.

Halcomb, M. 2002. Nursery Field Production. University of Tennessee Agricultural extension Service. Online at: www.utextension.utk.edu/hbin/Field Prod rev w equip.pdf.

NOAA. 2006. Climate Normals at Major Weather Observing Stations in all 50 States, Puerto Rico, and Pacific Islands. National Oceanic and Atmospheric Administration (NOAA), Environmental Satellite, Data, and Information Service. Online at: http://www1.ncdc.noaa.gov/pub/data/ccd-data.

USDA. 1986. Urban Hydrology for Small Watersheds. United States Department of Agriculture, Natural Resources Conversation Service. Technical Release 55.

USDA. 1990. Davis, F.M., R.A. Leonard, W.G. Knisel. GLEAMS User Manual, Version 1.8.55. U.S. Department of Agriculture, Agricultural Research Service (ARS), Southeast Watershed Research Laboratory, Tifton, GA. SEWRL-030190FMD.

USDA. 1999. Official Series Description – CIENEBA Series. U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). October. 2006. Online at: http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi?-P.

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).

USDA. 2002a. 2002 Census of Agriculture. U.S. Department of Agriculture, National Agricultural Statistics Service (NASS). Online at: http://www.nass.usda.gov/census/census02/preliminary/2002censusdates.htm.

USDA. 2002b Census of Agriculture County Profile for San Diego County, California. United States Department of Agriculture, California Agricultural Statistics Service. Online at: http://www.nass.usda.gov/census/census02/profiles/ca/.

USDA. 2004a. Agricultural Chemical Usage 2003 Nursery and Floriculture Summary. United States Department of Agriculture National Agricultural Statistics Service. October. 2006. Online at: http://usda.mannlib.cornell.edu/usda/current/AgriChemUsNursFlo/AgriChemUsNursFlo-09-15-2004.txt.

USDA. 2004b. Nursery Crops 2003 Summary. United States Department of Agriculture National Agricultural Statistics Service. October. 2006. Online at: http://usda.mannlib.cornell.edu/usda/nass/NursProd//2000s/2004/NursProd-07-26-2004.txt.

USDA. 2006. Soil Survey Areas of San Diego County, California. U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), Soil Data Mart. October. 2, 2006. Online at: http://soildatamart.nrcs.usda.gov.

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