RESULTS

GROUND-WATER AQUIFER SENSITIVITY ASSESSMENT

The natural sensitivity assessment consisted of developing a GIS layer for each of the seven DRASTIC parameters (depth to water, net recharge, aquifer media, soil media, topography, impact of the vadose zone, and hydraulic conductivity). These layers are described below followed by the combined natural sensitivity (NATSEN) coverage.

DEPTH TO WATER

The depth to water below the land surface in the Mesilla Valley and surrounding area including northwest El Paso County, Texas is presented in Figure 4 (figures are placed together at the end of this section). Table 12 presents the areal extent of the selected depth-to-water table intervals. The depth-to-water table indicates that over 60 percent of the study area had a depth to water greater than 100 feet (Table 12). Areas with depth to water less than 5 feet accounted for 5.3 percent, 5-10 feet 3.1 percent, 10-20 feet 7.3 percent, 20-30 feet 5.2 percent, 30-50 feet 7.2 percent, 50-70 feet 4.8 percent, 70-100 feet 6.4 percent, and over 100 feet 60.7 percent.

Table 12. Areal extent of depth-to-water table by interval, Mesilla Valley

Depth-to-water table interval (ft)	Areal extent (km^2)	Percent
0-5	121.7	5.3
5-10	69.6	3.1
10-20	167.2	7.3
20-30	118.6	5.2
30-50	164.2	7.2
50-70	108.9	4.8
70-100	147.1	6.4
100+	1,385.2	60.7
Total	2282.5	100.0

NET RECHARGE

The net recharge for the Mesilla Valley classified by land use ratings is presented in Figure 5. Table 13 presents the areal extent of each of the land use ratings. About 16 percent of the area was classified as agricultural and about 77 percent was classified as rangeland.

Table 13. Areal extent of net recharge areas, Mesilla Valley

Land use classification	Areal extent (km^2)	Percent
Urban or built-up land	109.0	4.8
Agricultural land	369.1	16.2
Rangeland	1769.2	77.5
Forest land	1.4	0.1
Water bodies	8.4	0.3
Wetland	0.7	< 0.1
Barren land	24.7	1.1
Total	2282.5	100.0

AQUIFER MEDIA

The aquifer media classification for the Mesilla Valley is presented in Figure 6. Table 14 presents the areal extent of each of the aquifer media classifications. About 47.8 percent of the area was classified as basin-fill, 23 percent as alluvium, and about 28.4 percent as Santa Fe or Pre-Santa Fe Group.

Table 14. Areal extent of aquifer media classification, Mesilla Valley

ptype	Aquifer media	Areal extent (km^2)	Percent
Qab	Basin-fill	1092.1	47.8
Qal	Alluvium	524.9	23.0
Qb	Basalt	18.3	0.8
QTs	Santa Fe Group	414.7	18.2
pQTs	Pre-Santa Fe Group	232.5	10.2
Total		2282.5	100.0

SOIL MEDIA

Table 15 presents the areal extent of the soil media classifications for the Mesilla Valley. Figure 7 presents a map of the Mesilla Valley for each of the soil media classes. Loamy sand was the dominant soil type found in the Mesilla Valley with over 46 percent of the study area classificied as such. Sandy loam was next with almost 14 percent.

Table 15. Areal extent of soil media classification, Mesilla Valley

Soil media	Areal extent (km^2)	Percent
Basalt	23.0	1.0
Caliche	0.4	< 0.1
Carbonate hardpan	19.7	0.9
Carbonate-cemented	171.4	7.5
Clay	40.7	1.8
Clay loam	148.2	6.5
Dumps & gravel pits	1.5	0.1
Limestone bedrock	108.8	4.8
Loam	95.2	4.2
Loamy sand	1,067.7	46.8
Rock outcrop	115.1	5.0
Sandy clay loam	53.6	2.3
Sandy loam	317.6	13.9
Silty clay loam	22.3	1.0
Silty loam	89.5	3.9
Water	7.8	0.3
Total	2282.5	100.0

TOPOGRAPHY

Table 16 presents the areal extent of the Mesilla Valley by topography classification. The study area is relatively level with over 60 percent classified with slopes less than 2 percent and more than 28 percent with slopes less than 6 percent. Figure 8 presents a map of the Mesilla Valley topography.

Table 16. Areal extent of the topography for the Mesilla Valley

Topography (percent slope)	Areal extent (km^2)	Percent
0-2	1,383.8	60.6
2-6	643.5	28.2
6-12	146.6	6.4
12-18	39.4	1.7
18+	69.2	3.1
Total	2,282.5	100.0

IMPACT OF VADOSE ZONE MEDIA

Table 17 lists the areal extent of the area classified for impact of the vadose zone. Over 47 percent of the area was classified as basin-fill and 23 percent as alluvium. Over 28 percent was classified as Santa Fe or Pre-Santa Fe Group. A map of the area with the impact of the vadose zone parameter is presented in Figure 9.

Table 17. Areal extent of the vadose zone media, Mesilla Valley

ptype	Impact of vadose zone	Areal extent (km^2)	Percent
Qab	Basin-fill	1,092.0	47.8
Qal	Alluvium	524.9	23.0
Qb	Basalt	18.3	0.8
QTs	Santa Fe Group	414.7	18.2
pQTs	Pre-Santa Fe Group	232.6	10.2
Total		2282.5	100.0

HYDRAULIC CONDUCTIVITY OF THE AQUIFER

Table 18 presents the areal extent of the hydraulic conductivity classes for the aquifer in the Mesilla Valley. Over 36 percent of the ground-water aquifer was classified as K7 and over 32 percent as K3. Figure 10 presents a map of the hydraulic conductivity classes for the Mesilla Valley.

Table 18. Areal extent of the hydraulic conductivity classes in the Mesilla Valley

Hydraulic conductivity class[1]	Areal extent (km^2)	Percent
K1	70.2	3.1
K2	336.5	14.7
K3	737.2	32.3
K4	132.6	5.8
K5	78.5	3.4
K6	97.1	4.3
K7	830.4	36.4
Total	2282.5	100.0

[1] See table 7, pg 21.

NATURAL SENSITIVITY ASSESSMENT

By combining the seven DRASTIC parameters a natural sensitivity index was developed. These values were grouped into six categories *very slight* - indicating the ground-water aquifer is very well protected and contamination risk from nonpoint sources is very low; *slight* - indicating the ground-water aquifer is reasonably well protected, but because one or more of the hydrologic parameters are conducive to contamination, there is a higher level of risk of nonpoint source pollution; *low* - the ground-water aquifer is somewhat protected, but more than one of the parameters are conducive to contamination; *moderate* - the ground-water aquifer is susceptible to contamination because there are few natural protections; *severe* - the ground-water aquifer is much more susceptible to contamination due to a number of hydrologic conditions; and *extreme* - all hydrologic parameters are conducive to the rapid transport of contamination to the ground-water aquifers. Results indicated that of the 2,282 km^2 included in the study area, a very small area (less than one percent) was classified as *extreme*. However, this area as well as the *severe* class deserve special attention, as natural conditions are such that any contaminant is likely to reach the water table quite rapidly. Table 19 presents the aerial extent of each of the six natural sensitivity categories. Plate 1 presents the NATSEN coverage in map form (Plate 1 is contained in the packet on back cover).

Table 19. Areal extent of the natural sensitivity classes in the Mesilla Valley

Natural Sensitivity Class	Areal extent (km^2)	Percent
Very Slight	262.0	11.5
Slight	313.8	13.7
Low	1,159.3	50.8
Moderate	351.0	15.4
Severe	183.5	8.0
Extreme	12.9	0.6
Total	2282.5	100.0

EVALUATION OF BEST MANAGEMENT PRACTICES

The pesticides of interest were metholachlor (Dual) and cyanazine (Bladex), which are used on chile and cotton crops, respectively, in the Mesilla Valley. These chemicals are part of the EPA-listed pesticides requiring monitoring because of their frequent detection in ground water. IRRSCHM runs were made to evaluate local farmers' irrigation and pesticide management practices on Bladex and Dual leaching in different soil classes. Model runs were also made to evaluate alternate management practices for scheduling irrigation. The alternate irrigation scheduling management practices included: tensiometer-based irrigation scheduling at 50 percent plant available water depletion level with the tensiometer porous cup placed at fixed soil depth (30-cm); tensiometer-based irrigation scheduling at 50 percent plant available water depletion level with the tensiometer porous cup moving with the center of the root zone; and tensiometer-based irrigation scheduling with the tensiometer porous cup moving with 75 percent of the dynamic crop root zone over time. For all simulations, a 30-year cropping sequence was used. Bladex and Dual concentrations in the soil water at the 180-cm were scaled using the corresponding Health Advisory Level for each pesticide.

CURRENT FARMERS' MANAGEMENT PRACTICES

According to the survey conducted, farmers use the following practices in their agricultural production:

Irrigation

Fields are irrigated based on when farmers are supplied with water from the irrigation district. EBID establishes an equal allotment of water per acre at the beginning of the growing season. If the allotment is insufficient to satisfy crop demands, farmers supplement the amount of surface water obtained from EBID by use of ground-water irrigation wells. Irrigation timing is based on individual farmer's experience. All the water supplied by EBID is used during the periods that the fields are irrigated. The practice could lead to under irrigation when water requirements exceed supply, in which case, crops could be grown under water stress leading to yield reduction. Alternatively, over irrigation occurs when water supply exceeds requirements, which could lead to leaching of applied agricultural chemicals.

Amount and Time of Chemical Application

Farmers apply chemicals at manufacturers' recommended rates as contained on pesticide labels. Likewise, the chemical is applied according to the recommended time stipulated on the label. Adhering to label recommendations allows farmers to apply safe amounts of chemicals at the most appropriate time to achieve optimum pest control results. Also, the practice may reduce the pollution potential of chemicals in the environment. When the time of pesticide application is not specified on the label, the chemical application time is based on farmers' experience.

Crop Rotation

Most farmers in the area practice crop rotation by growing a different crop the following year. The rotation practice offers the opportunity to break from continuous use of a specific chemical for a long period of time, thus minimizing the build up of applied chemicals in the soil system or the environment.

Land Surface Leveling

Local farmers normally laser-level the surface of farm lands periodically. The practice is commonly accompanied by a basin irrigation system. Land surface leveling improves the uniformity of water distribution on the field.

Cover Crops

Farmers do not grow leguminous crops during fallow periods. Growing leguminous crops could increase soil organic matter content, a soil constituent having the ability to retard organic pesticide's downward movement through the soil profile. Some farmers, however, do grow sudan grass and sorghum during the fallow periods and then disk them to build up surface soil layer organic matter content.

The model IRRSCHM was used to predict the impact farmers' management practices and alternate irrigation scheduling management practices may have on crop yield, leaching fraction, and pesticide leaching. Besides soil physical properties (field capacity, permanent wilting point, and bulk density), IRRSCHM requires organic matter and pesticide half-life distribution in the soil profile, planting and harvest dates. IRRSCHM was modified to simulate crop growth characteristics, soil moisture and pesticide dynamics in the soil profile in multiple-year time periods. The modification allowed for the eventual assessment of continuous cropping (same crop or different crops) on the movement of pesticide applied in at least one cropping year in a multiyear time sequence.

Specific characteristics for each soil type, Las Cruces climate data covering the entire simulation period, farmers' management practices and the proposed BMPs, and planting and harvest dates were used to drive IRRSCHM. The operation sequence, including batch files, for generating all the input files to drive IRRSCHM is presented in Appendix A. For each simulation, crop yield, leaching fraction, and pesticide concentration in soil solution at 180 cm below the soil surface were recorded and used for comparing and contrasting the impact of different management practices on pesticide leaching.

For each soil class, the relative maximum Bladex concentration at the 180-cm soil depth (Fig. 11) varied reflecting textural and organic matter content distribution differences in lower soil layers for individual soil series of soil classes. For example, maximum Bladex concentrations for loamy sand soil class ranged from 7.19×10^{-10} to 3.25×10^{-8} mg L^{-1} during a 30-year simulation period. The corresponding maximum Bladex concentrations for clayey soil class ranged from 2.36×10^{-21} to 2.89×10^{-20} mg L^{-1}. Based on the mean concentrations, the relative Bladex concentration was 6.37×10^{-7} for loamy sand and 1.20×10^{-18} for clayey soils (Fig. 12). These concentrations were 6 orders of magnitude less than the 1.3×10^{-2} mg L^{-1} Bladex Health Advisory Level. Generally, the mean relative Bladex concentrations at the 180-cm soil depth increased with increasing soil sand content (Fig. 12). Differences in relative concentrations among all the soil classes reflect differences in saturated hydraulic conductivity, organic matter content, and pesticide half-life values distribution in the soil profiles for the different soil classes.

The trend in Dual concentrations at 180-cm soil depth for the different soil classes (figs. 13 and 14) was similar to that observed for Bladex. However, Dual concentrations at 180-cm soil depth were comparatively higher than those of Bladex. Similarly, Dual concentrations relative to the 5.25×10^{-1} mg L^{-1} Health Advisory Level were higher compared to Bladex (Fig. 15). For example, the mean relative Dual concentration for the sandy soil class was about 3 orders of magnitude less than the 5.25×10^{-1} mg L^{-1} Dual Health Advisory Level whereas that of Bladex was about 6 orders of magnitude less than the 1.3×10^{-2} mg L^{-1} Bladex Health Advisory Level. Bladex and Dual concentrations were negligible compared to the Health Advisory Levels. However, the results showed that 1) less Bladex reached the bottom of the root zone compared to Dual because of the relatively short maximum Bladex half-life value of 14 days, 2) the area ground water is much more susceptible to Dual pollution than to Bladex, and 3) that Dual health threat is much higher than that of Bladex under current farmers' management practices.

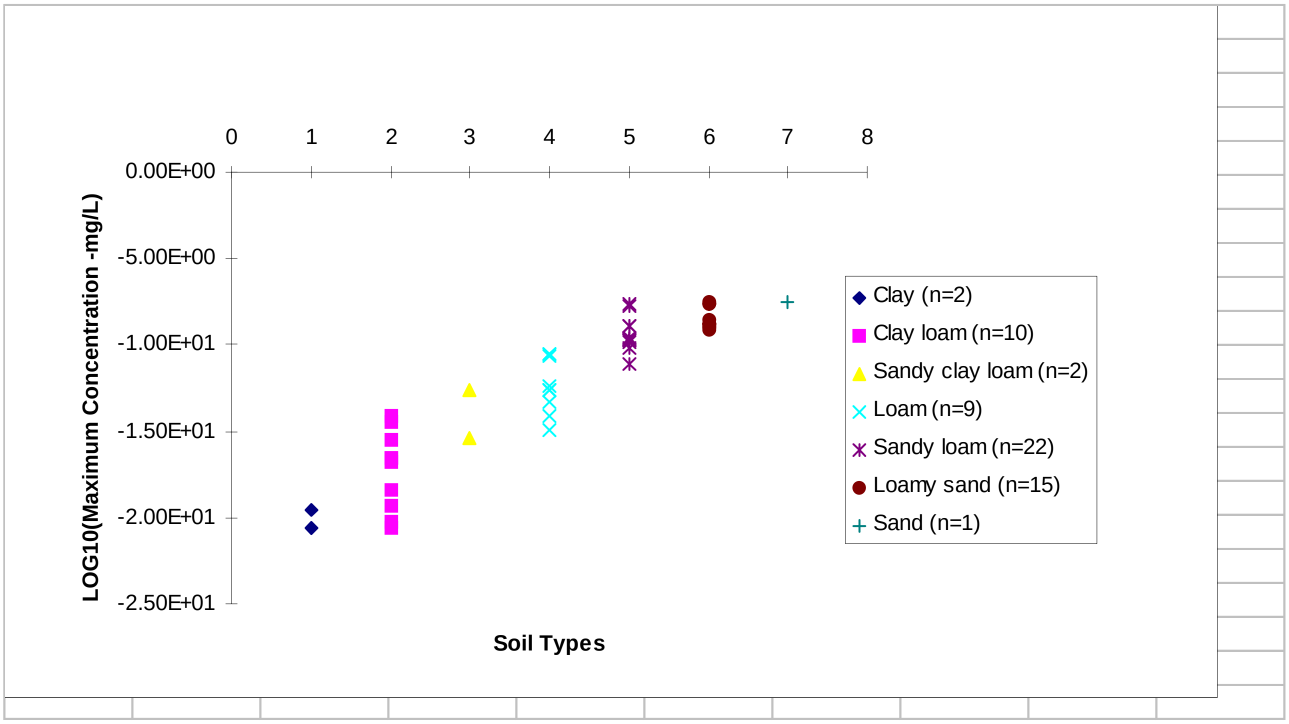

Figure 11. Maximum Bladex concentrations at 180-cm soil depth under the farmers' management practices.

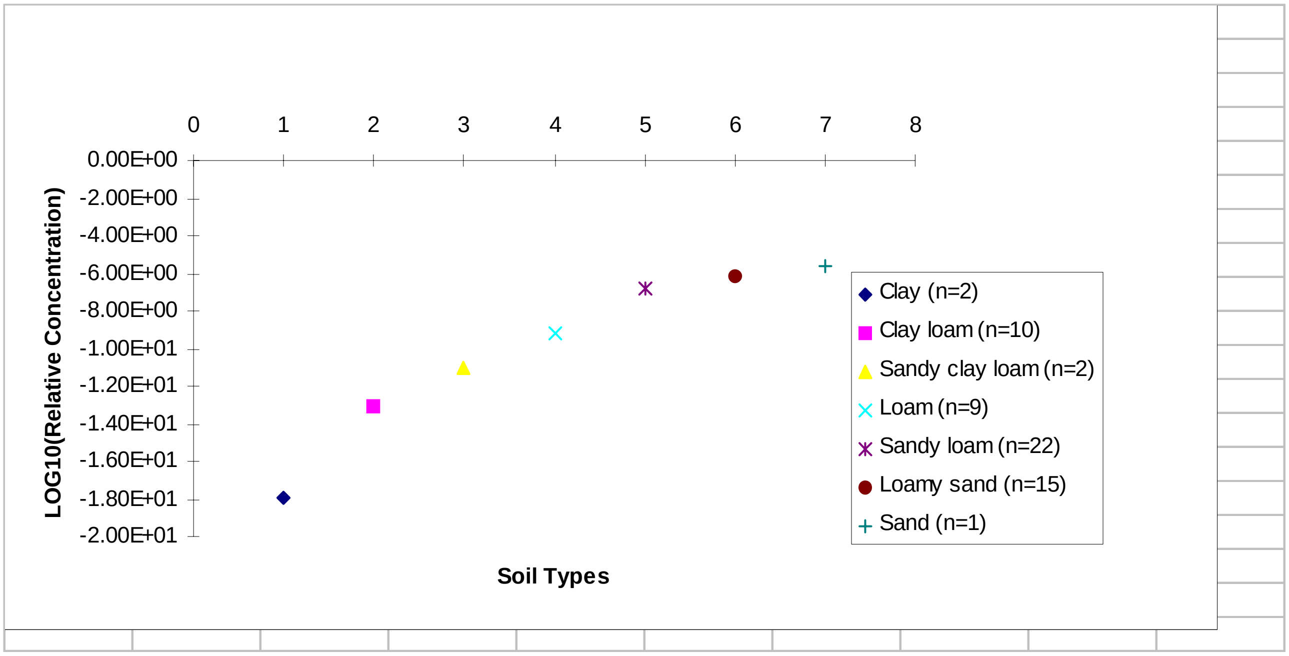

Figure 12. Relative maximum Bladex concentrations at 180-cm soil depth under the farmers' management practices: mean value for each soil type.

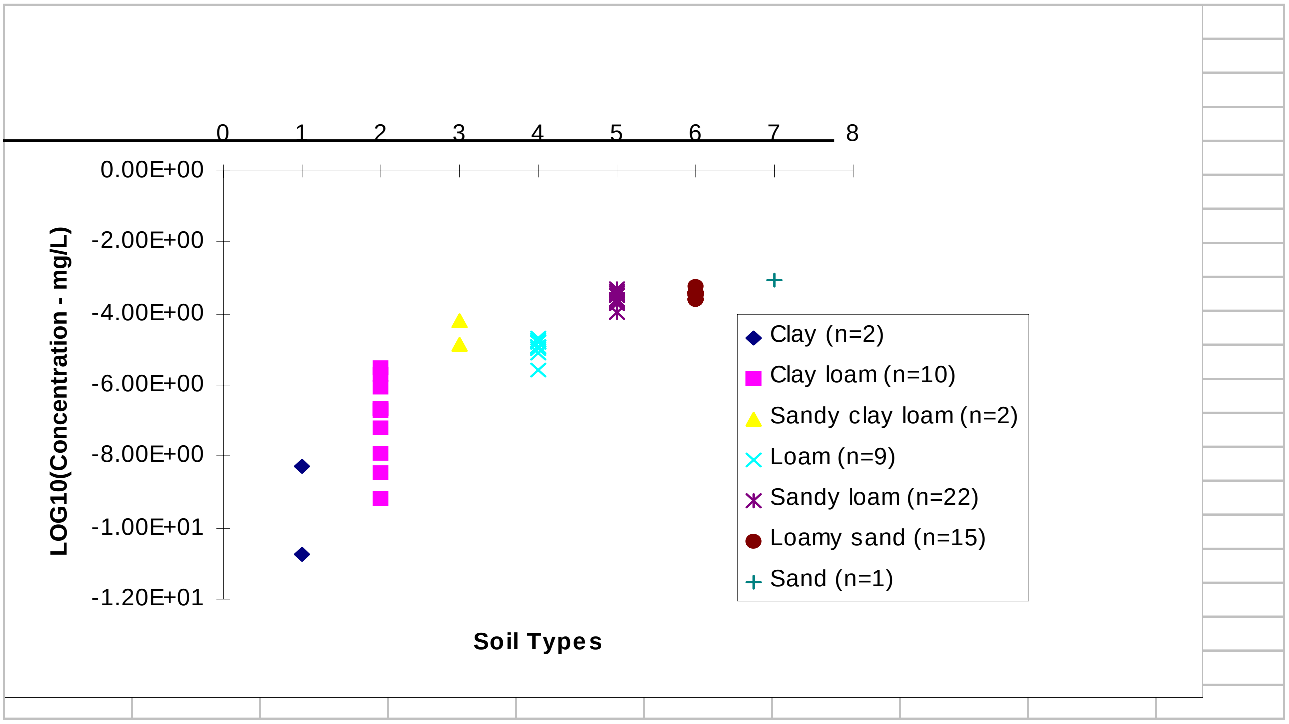

Figure 13. Maximum Dual concentrations at 180-cm soil depth under the farmers' management practices.

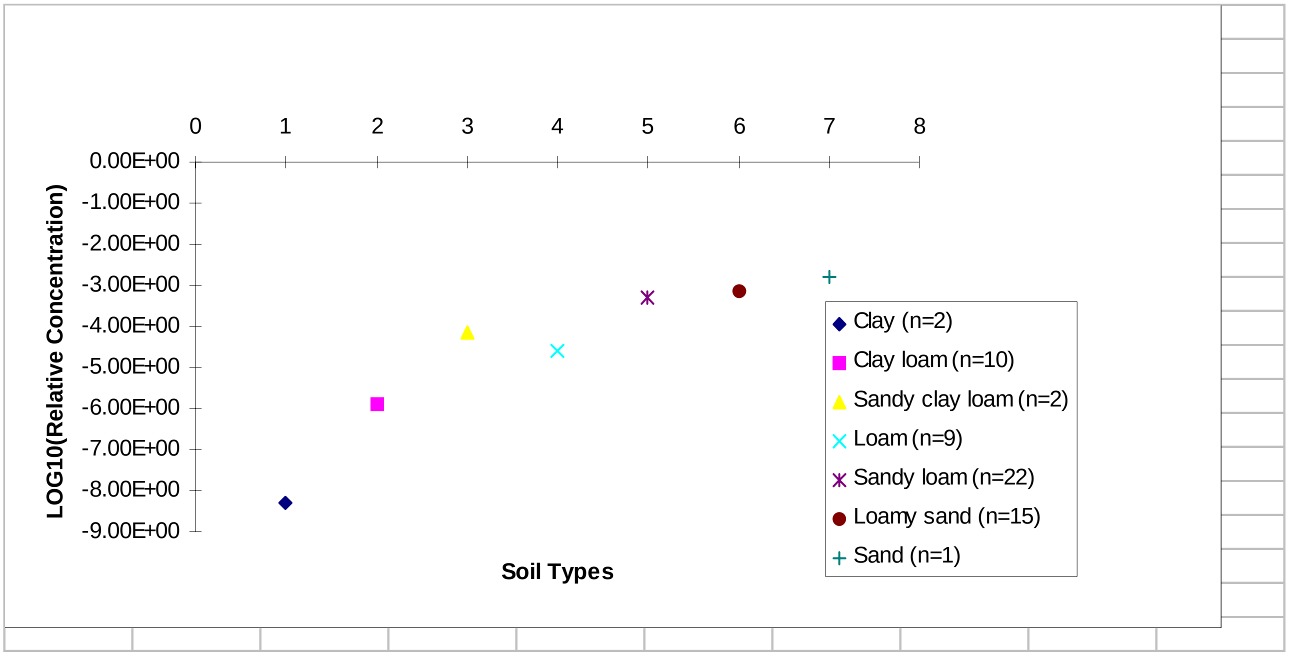

Figure 14. Relative maximum Dual concentrations at 180-cm soil depth under the farmers' management practices: mean value for each soil type.

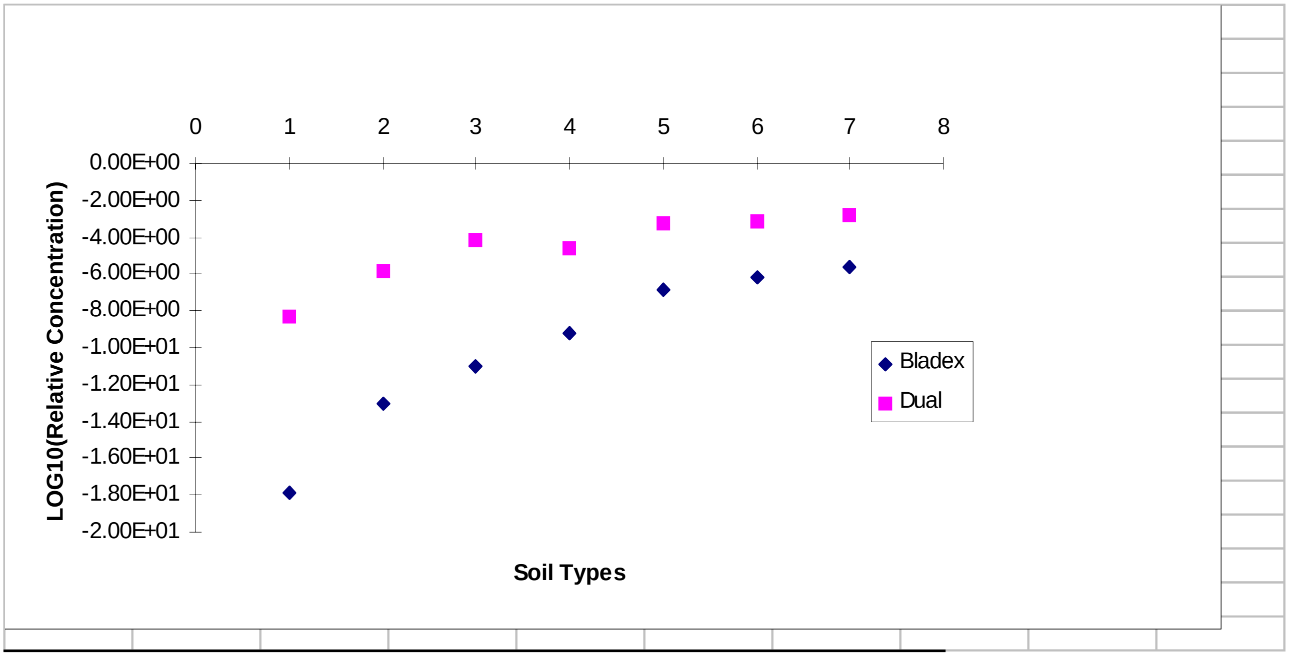

Figure 15. Relative maximum Bladex and Dual concentrations at 180-cm soil depth under the farmers' management practices: mean value for each soil type.

IRRIGATION SCHEDULING WITH TENSIOMETERS

Three irrigation scheduling practices based on tensiometers were evaluated: 1) 30-cm fixed depth for the tensiometer porous cup, 2) moving the tensiometer porous cup with the center of dynamic crop root zone, and 3) moving the tensiometer porous cup with 75 percent of the dynamic root zone. Irrigation water was applied immediately when tensiometer threshold values were observed. The threshold values for tensiometer readings at which irrigation was triggered in different soil types were based on NRCS recommendations The fixed tensiometer at 30 cm resulted in large and unrealistic calculations of water applications. The tensiometer at the center of the dynamic root zone resulted in the model applying the correct amount water on the sand and sandy loam fields but over watered on the clay and clay loam field. When the tensiometer was placed with 75 percent of the dynamic root zone on these fields the correct amount of water was applied (Fig 16). For each irrigation management practice, Bladex concentrations were much less than Dual concentrations, following the same trend observed under farmers' management practices. However, Bladex concentrations with the tensiometer placed with 75 percent of the dynamic root zone were less than the concentrations of Bladex when the tensiometer was placed at 50percent of the dynamic root zone (Table 20). Similar results were observed for Dual (Table 21). This occurred because the irrigation scheduling model put less water on the fields when irrigations were scheduled using tensiometers placed with 75 percent of the dynamic root zone.

Table 20. Mean maximum Bladex concentrations at 180-cm soil depth resulting from tensiometer-based irrigation scheduling

Soil Class ID Number	Soil Class	Moving Tensiometer (mg/L) 0.5 depth	Stationary Tensiometer (mg/L) 0.75 depth
1	Clay	7.9E-07	2.3E-09
2	Clay loam	1.2E-04	3.5E-06
4	Loam	2.50E-05	2.9E-07
5	Sandy loam	1.50E-05	4.8E-07
7	Sand	1.6E-04	6.3E-06

Table 21. Mean maximum Dual concentrations at 180-cm soil depth resulting from tensiometer-based irrigation scheduling

Soil Class ID Number	Soil Class	Moving Tensiometer (mg/L)	Stationary Tensiometer (mg/L)
1	Clay	1.8E-04	1.4E-05
2	Clay loam	4.4E-04	1.7E-04
4	Loam	3.0E-04	3.1E-05
5	Sandy loam	2.5E-04	4.8E-05
7	Sand	1.6E-04	1.3E-04

Tensiometer-based irrigation scheduling resulted in Bladex and Dual concentrations greater than those obtained under farmers' management practices. For example, with a tensiometer placed at 50 percent of the dynamic root zone, the mean Dual concentration at the 180-cm soil depth of sandy soils was 20 times less than the Health Advisory Level compared to 625 times less under the farmers' management practices.

IRRIGATION SCHEDULING AT 50 PERCENT PLANT AVAILABLE WATER DEPLETION

Scheduling irrigation at 50 percent plant available water depletion is a normally recommended management practice used to ensure adequate crop growth and minimal leaching. Bladex and Dual concentrations at 180-cm soil depth under this practice followed the trend of increasing concentrations with sandy soils observed under the farmers' management practices. The difference, however, is that comparatively higher Bladex and Dual concentrations reached the 180-cm soil depth when irrigation scheduling was at 50 percent plant available water depletion. For example, the mean Bladex and Dual concentrations in sandy soil class were 232 and 20 times less, respectively, than their corresponding Health Advisory Level. In contrast, Bladex and Dual concentrations under the farmers' management practices were 416,666 and 625 times less, respectively, than the corresponding Health Advisory Level. Thus, higher levels of Bladex and Dual concentrations reached the 180-cm soil depth when irrigation was scheduled at 50 percent plant available water depletion compared to the resultant concentrations under farmers' management practices. Because of system constraints, farmers put on less water than they would if they scheduled irrigation to prevent crop stress.

COMPARISON OF BLADEX AND DUAL CONCENTRATIONS

Bladex and Dual concentrations were highest in all soil classes under tensiometer-based irrigation scheduling management practices compared to concentrations under other management practices. In contrast, the lowest concentrations occurred under current practices. Additionally, Bladex and Dual concentrations under irrigation management that schedules irrigation at 50 percent plant available water depletion fall between the highest and the lowest concentrations observed under management practices discussed earlier. Tables 22A-D present mean Bladex and Dual relative concentrations for each soil class under different management practices. The relative concentrations are modeled concentrations/Health Advisory Level.

Table 22. Mean relative maximum Bladex and Dual concentrations under different management practices (Relative concentration is concentration/Health Advisory Level)

A. Management Practice: Farmers' Management Practices

Soil Class ID Number	Soil Class	Relative Concentration Bladex	Relative Concentration Dual
1	Clay	1.20E-18	4.80E-09
2	Clay loam	8.44E-14	1.30E-06
3	Sandy clay loamß	9.96E-12	7.45E-05
4	Loam	6.84E-10	2.49E-05
5	Sandy loam	1.55E-07	5.11E-04
6	Loamy sand	6.37E-07	6.85E-04
7	Sand	2.42E-06	1.63E-03

B. Management Practice: Irrigation Schedule at 50 Percent Plant Available Water Depletion

Soil Class ID Number	Soil Class	Relative Concentration Bladex	Relative Concentration Dual
1	Clay	3.22E-12	1.67E-04
2	Clay loam	2.28E-07	1.17E-03
3	Sandy clay loamß	1.95E-06	4.08E-03
4	Loam	8.92E-07	3.01E-03
5	Sandy loam	9.46E-06	1.27E-02
6	Loamy sand	4.18E-05	2.39E-02
7	Sand	4.29E-04	5.35E-02

C. Management Practice: Moving Tensiometer at 50% of the dynamic root zone

Soil Class ID Number	Soil Class	Relative Concentration Bladex	Relative Concentration Dual
1	Clay	1.50E-06	1.40E-02
2	Clay loam	2.20E-04	3.40E-02
4	Loam	4.70E-05	2.30E-02
5	Sandy loam	3.00E-05	1.90E-02
7	Sand	3.20E-05	5.10E-02

D. Management Practice: Moving Tensiometer at 75% of the dynamic root zone

Soil Class ID Number	Soil Class	Relative Concentration Bladex	Relative Concentration Dual
1	Clay	4.50E-09	1.10E-03
2	Clay loam	6.70E-06	1.30E-02
4	Loam	5.50E-07	2.40E-03
5	Sandy loam	9.20E-07	3.70E-03
7	Sand	1.20E-05	1.00E-03

Farmers' requests for water are usually not met immediately by EBID, a situation that results in water stress periods between two consecutive irrigations. The delay in water delivery allows some pesticides to degrade before water is eventually delivered onto the farmers' fields. Additionally, leaching is reduced if the delivered water is not enough to replenish the root zone. These conditions likely accounted for the least Bladex and Dual concentrations at the 180-cm soil depth under farmers' management practices. Farmers suffer for their management practices by having decreased crop evapotranspiration and yield. Study results showed that Bladex and Dual concentrations at the 180-cm soil depth were insignificant compared to the Health Advisory Level for each pesticide, and practically no ground-water contamination by Bladex and Dual leaching resulting from the current farmers' management practices in the Mesilla Valley. Thus, current farmers' management practices do not pose a threat to area ground-water quality.

The local NRCS office recommendations for the tensiometer-based irrigation scheduling suggest that crops grown on sandy, sandy loam, loam, and clay loam soils be irrigated at about 6, 23, 44, and 74 KPa tensiometer readings, respectively (Appendix B), which correspond to 49, 35, 23, and 14 percent plant available water depletion levels in the same order (Irrigation scheduled for sandy soil using tensiometers have a larger percent of the available water depleted before an irrigation compared to the depletion level of available water at irrigation for a clay soil.) The plant available water values were estimated using Campbell's (1985) soil moisture release curve model with FC and PWP values for each soil class taken from the data given by Israelsen and Hansen (1962). The 80 KPa tensiometer reading recommended by NRCS for clayey soils resulted in an extremely low plant available water depletion level. Instead, the 210 KPa value was used to obtained a 19 percent available water depletion level in clayey soils. The irrigation scheduling management practices based on the NRCS recommendations resulted in frequent irrigations and unrealistic seasonal irrigation amounts if the tensiometer was placed at 50 percent of the dynamic root zone, for crops grown on fine textured soils, creating high soil moisture conditions that enhanced pesticide leaching. For example, the mean seasonal irrigation amount and leaching fraction for clay loam soil were about 97.0 cm and 0.21, respectively, under the farmers management practices, 160 cm and 0.35 under irrigation scheduling at 50% plant available water depletion, and 400.0 cm and 0.68 under the tensiometer-based irrigation scheduling when the tensiometer was placed at 50 percent of the dynamic root zone depth. When the tensiometer was placed at 75 percent of the dynamic root zone, the water applied decreased to 225 cm (Fig. 16) and the leaching fraction was only 50 percent. The graphs showing the mean seasonal leaching fractions, and relative evapotranspirations (relative yields) resulting from the different management practices tested are presented in Appendix C. The study results showed that irrigating the fields soon after the threshold tensiometer readings were observed was an appropriate management practice only if the tensiometer was placed in the proper position of the root zone based on the soil type. Tensiometers should be place to the 50 percent depth of the root zone in sand and sandy loam soils but must be placed at the 75 percent dept of the root zone in heaver clay and clay loam soils. Thus, the relatively high Bladex and Dual concentrations at the 180-cm soil depth under the tensiometer-based irrigation management practices were the result of more frequent irrigations during crop growth periods. Leaching under the tensiometer-based irrigation management practices could be minimized by increasing the values of the tensiometer threshold readings at which irrigations are triggered or by delaying 3-7 days before irrigation when the recommended tensiometer threshold readings are observed. Preliminary field studies by EBID showed that irrigating the fields 3 days after tensiometer threshold readings were observed resulted in less applied water compared to the amount of water used under the farmers practices.

SUMMARY

The DRASTIC model was used to assess aquifer sensitivity by combining data sets that describe the depth-to-ground water, recharge rates, aquifer material, soils composition, land slope, vadose zone materials, and saturated hydraulic conductivity for the Mesilla Valley in Doña Ana County. The data requirements and techniques necessary to employ the DRASTIC model in other regions of New Mexico was evaluated. GIS coverages were developed for each of the DRASTIC parameters and combined into a natural sensitivity coverage. The resulting natural sensitivity values were grouped into six categories: *very slight* - indicating that the ground-water aquifer is very well protected and risk of contamination from nonpoint sources is very low; *slight* - the ground-water aquifer is reasonably well protected, but because one or more of the hydrologic parameters are conducive to contaminant transport, there is a higher level of risk of nonpoint pollution; *low* - the ground-water aquifer is somewhat protected, but more than one of the parameters are conducive; *moderate* - the ground-water aquifer is susceptible to contamination because few natural protections exist; *severe* - the ground-water aquifer is much more susceptible to contamination due to several hydrologic conditions; and *extreme* - all hydrologic parameters are conducive to the rapid transport of contamination to the ground-water aquifer. Results indicated that of the 2,282 km^2 included in the study area, less than one percent was classified as *extreme*, slightly over 10 percent as *severe*, almost 19 percent as *moderate*, nearly 43 percent as *low*, about 16 percent as *slight*, and over 12 percent as *very slight*.

The model IRRSCHM was used to assess local farmers' management practices and three irrigation scheduling practices for their potential impact on Bladex and Dual leaching into ground water in a 30-year cropping sequence. Study area soils were grouped into appropriate classes based on texture so that study results could be categorized by soil class for each management practice. Field capacity, permanent wilting point, organic matter content, and pesticide half-life distribution in each soil class profile were estimated and used to drive IRRSCHM.

Bladex and Dual concentrations at the 180-cm soil depth generally increased with increasing soil sand content. Bladex and Dual concentrations reaching the 180-cm soil depth were at most two and three orders less, respectively, than the corresponding Health Advisory Level for all the management practices considered in the study. However, Bladex and Dual concentrations at the 180-cm soil depth were least, being at most six and two orders less than the Health Advisory Level for each pesticide compared to concentrations observed under different management practices. This suggests that the current farmers' management practices do not adversely impact the ground-water resources in the Mesilla Valley. This may be due to deficit irrigation conditions imposed by late water deliveries to farmers' fields. The model indicated that tensiometer-based irrigation scheduling, in which water is applied immediately when tensiometer threshold readings are observed, was the least appropriate management practice for controlling pesticide leaching when the tensiometer was placed in the correct depth in the dynamic root zone. The tensiometer-based irrigation scheduling could be improved by increasing the values of the threshold readings at which irrigation is triggered. Because EBID has observed a reduction in the amount of water normally used by farmers when irrigation is done 3-7 days after the tensiometer threshold readings are observed, it is recommended that future studies should assess how different tensiometer threshold readings and depth of placement affect the level of seasonal irrigation levels, leaching fractions, and relative evapotranspirations (relative yields). The study results could assist in selecting the appropriate tensiometer threshold readings and placement depth for different soil classes that will result in minimal pesticide leaching and yield reductions. The methodology developed in the study to assess farming practices impact on pesticide leaching in the Mesilla Valley could be used in other locations for preliminary regional studies to identify farming practices capable of impacting ground water or identify areas prone to pesticide leaching.