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Introduction to the OSU Extension Soil Sensitivity Database

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The OSU Extension Soil Sensitivity Database lists nonirrigated and irrigated soil sensitivity ratings for every map unit of every soil survey in Oregon. These ratings were developed for the Oregon Water Quality Decision Aid, a tool for evaluating groundwater vulnerability to pesticide contamination. The database also includes selected soil properties such as permeability and depth to water table, and other ratings such as leaching potential, runoff potential, and sorption potential that were used to develop soil sensitivity ratings.

The soil sensitivity database is available in hard copy or electronic format:

- For a hard copy of an individual county or soil survey area, write OSU Extension Soil Science, 3017 Ag and Life Sciences, Oregon State University, Corvallis, Oregon, 97331-7306, or call 541-737-5712. There is a nominal charge for copying, postage, and handling.
- The electronic version is included in the *Oregon Water Quality Decision Aid (OWQDA)* computer software, a fully automated version of OWQDA. See page 2 for ordering instructions.

Overview of key terms

Soil sensitivity is a soil's general tendency to allow a chemical to be transported through the soil to groundwater. Major factors influencing soil sensitivity are *leaching potential*, *hydraulic loading*, and *sorption potential*. These factors are combined to create five sensitivity classes ranging from Very Low to Very High for both non-irrigated and irrigated conditions.

In general, low leaching potential combined with high sorption potential produces a low soil sensitivity rating. Soils in this class provide relatively high levels of protection for groundwater resources. Conversely, soils with high leaching potentials and low sorption potentials have high sensitivity ratings and cannot provide as much groundwater protection.

Just because a soil is sensitive, however, does not necessarily mean the groundwater will become contaminated. Groundwater vulnerability also depends on pesticide properties, management practices, site conditions, and environmental factors, all of which must be evaluated to determine the actual risk of groundwater contamination.

Intrinsic leaching potential is a soil's ability to transmit water independent of water availability. It is calculated using only soil permeability and depth to groundwater. Water moving through soils with high intrinsic leaching potential is more likely to carry dissolved materials, including pesticides, to groundwater.

Hydraulic loading is the amount of water available at the soil surface to create leaching conditions. Hydraulic loading depends on rainfall, irrigation, and surface runoff. Sandy soils may have high leaching potentials, but if the only source of hydraulic loading is from rainfall in an 8-inch precipitation zone, the actual amount of leaching is extremely low. Irrigating such soils may substantially increase the actual leaching potential.

Runoff decreases the amount of water that enters the soil, thus decreasing the amount of hydraulic loading available to drive chemicals toward groundwater. Soils with high runoff potentials are more likely to contribute to surface water contamination.

Dryland, or *nonirrigated leaching potential*, corrects the intrinsic leaching potential for hydraulic loading due only

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to rainfall. In areas of relatively high precipitation, the intrinsic leaching potential and the nonirrigated leaching potential are the same. In areas where annual rainfall is too low to move water completely through the soil profile, the nonirrigated leaching potential is lower than the intrinsic leaching potential.

The *irrigated leaching potential* corrects the intrinsic leaching potential for hydraulic loading due to both rainfall and irrigation. In high rainfall areas, irrigation raises the leaching potential one class above the corresponding nonirrigated rating. In low rainfall areas, irrigation compensates for lack of rainfall, and the irrigated leaching potential is equal to the intrinsic leaching potential. All soils in the database are rated for irrigated leaching potential even though they may not be used for irrigated agriculture.

Sorption potential is a relative estimate of a soil's ability to retain contaminants. Sorption is influenced by soil organic matter and soil texture. Soils with high organic matter and high clay contents have higher sorption potentials than soils with low organic matter and low clay contents.

Related OSU Extension materials

Determination of Soil Sensitivity Ratings for the Oregon Water Quality Decision Aid, EM 8708, by J.H. Huddleston (1998). $2.50

How Soil Properties Affect Groundwater Vulnerability to Pesticide Contamination, EM 8559, by J.H. Huddleston (1994). $1.00

Oregon Water Quality Decision Aid Computer Software, EM 8706, by J.H. Huddleston (1998). $25.00

The OSU Extension Pesticide Properties Database, EM 8709, by P.A. Vogue, E.A. Kerle, and J.J. Jenkins (1998). $2.50

The OSU Extension Soil Sensitivity Database (1998). Order from the OSU Department of Soil Science (541-737-5712).

An Overview of the Oregon Water Quality Decision Aid (OWQDA), EM 8705, By J.H. Huddleston (1998). $1.00

Site Assessment for Groundwater Vulnerability to Pesticide Contamination, EM 8560, by E.A. Kerle, P.A. Vogue, J.J. Jenkins, and J.H. Huddleston (Revised 1998). $1.50

Understanding Pesticide Persistence and Mobility for Groundwater and Surface Water Protection, EM 8561, by E.A. Kerle, J.J. Jenkins, and P.A. Vogue (1994). $1.50

How to order

To order copies of the above materials (except for *The OSU Extension Soil Sensitivity Database*), or the OWQDA computer software, send the complete title and series number, along with a check or money order for the amount listed, payable to Oregon State University, to the address below. We offer discounts on orders of 100 or more copies of a single publication title and for 12 or more copies of a single computer software program. Please call 541-737-2513 for price quotes.

Send orders and payment to:

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Order *The OSU Extension Soil Sensitivity Database* from the OSU Department of Soil Science (541-737-5712).

Our Educational Materials catalog and many of our publications are available on the World Wide Web at eesc.orst.edu

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