

Soil Ratings for Selecting Pesticides for Water Quality Goals¹

T.A. Obreza and G. W. Hurt²

A soil survey is an inventory of the soil resources of a county or other area of interest. Soil surveys are conducted and published in order to provide information on the nature and occurrence of soils, and to help land users understand some of the limitations for different land uses that might exist in various, contrasting segments of the landscape. In conducting a soil survey, soil scientists walk the landscape and examine the soil at intervals, observing color, texture, layering phenomena, water table fluctuations, slope of the land, kinds of native plants, and other features that help to characterize and identify soils. These soil scientists dig many holes, mainly using soil augers about 7 feet in length, to study, classify, and delineate soils on maps.

USING YOUR COUNTY SOIL SURVEY REPORT TO EVALUATE YOUR SOIL RESOURCES

County soil survey reports are published by the USDA Natural Resources Conservation Service (NRCS), with cooperation from the University of

Florida Agricultural Experiment Stations and Soil and Water Science Department, the Bureau of Soil and Water Conservation of the Florida Department of Agriculture and Consumer Services, the Florida Department of Transportation, and, where national forest lands are involved, the USDA Forest Service.

Soil survey reports have slightly different formats depending on the year they were published and other factors. But they all contain roughly the same information. The beginning of each report contains sections dealing with the nature of the study area, including its history, agriculture, climate, and major land uses. The following section describes the generalized map units that are found on the General Soil Map of the County (i.e., the colored fold-out map that appears near the back of the book). These generalized map unit descriptions, together with the general soil map itself, can be very useful in gaining a feel for the overall landscape of the county, but they lack the detail necessary to make detailed interpretations of small segments of the landscape. Fortunately, the next section of the report gives

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 2. T.A. Obreza, Professor, Soil and Water Science Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville FL 32611-0290; and G. W. Hurt, National Leader for Hydric Soils, Natural Resources Conservation Service, USDA, Gainesville, FL.

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descriptions of the map units that are found on the fold-out, photo-based soil maps that are attached in the back of the book (or, in the case of some counties such as DeSoto, Columbia, and Sumter, the stand-alone maps that are held loose in an envelope). The detailed soil map unit descriptions help the user to envision and understand the three-dimensional landscape that occurs on the property in question. Here one gains a feel for the occurrence, appearance, nature, and behavior of the soils as well as the degree of variability and consequent imprecision that one might expect in the mapping of soils on this tract.

Next in the soil survey report are discussions of the use and management of the soils of the county, and detailed technical descriptions of soil profiles and the various laboratory analyses and interpretations that may have been made on the soils of the survey area. (In some older reports, detailed technical descriptions of soil profiles are found earlier in the report along with the soil map unit descriptions). Finally, there are lengthy tabulations of interpretations, or predictions, of the behavior of the soil map units in the contexts of a wide variety of land uses, from agricultural to nonagricultural.

Every soil survey user should take the time to become familiar with the contents of the soil survey report and with the nature of the soils in the overall survey area as well as those in any specific area(s) of interest. Users also should be sure to remember that assistance is available to better understand the nature and use of soil survey reports and of the lands and soils of the survey area. Such assistance may be obtained from local Soil and Water Conservation District offices, usually listed in the phone book under county government (or perhaps under U.S. Government — Department of Agriculture — Natural Resources Conservation Service, which is the federal agency that staffs these offices along with county personnel); from local offices of the IFAS Cooperative Extension Service; and/or from private firms staffed by professional soil scientists.

LOCATING YOUR LAND HOLDINGS IN THE SOIL SURVEY REPORT

A soil survey report has on its inside front cover a section entitled "How to Use this Soil Survey."

Guidance is given here in finding one's property or other tract of interest on the photo-based soil maps and in going to other places in the report to gain understanding of the occurrence and nature of soils found there. This "how-to" section, together with guidance from agency personnel and other experienced makers or users of these reports, will get the user past the initially daunting task of locating one's self on the maps and finding the associated text and tables in the report. One page that the user will refer to repeatedly in getting familiar with the report is the "Index to Map Sheets," a fold-out page that usually follows the General Soil Map but precedes the photo-based maps. On this page is a map of the county with superimposed, wide-bordered, numbered rectangles covering it. These superimposed rectangles correspond with the similarly numbered, photo-based soil maps themselves. Note that the county map itself, "beneath" the superimposed rectangles, shows state and county highways, major cultural features (lakes and communities), and section/range/township markings. Knowing the location of the property in question relative to these features will help the user to identify approximately which photo-based map sheet or sheets depict the tract. The map sheets themselves are numbered in circles that appear in the upper right or left corners of the maps. Note that cultural and other landscape features, as well as section corners, are shown in even greater detail on the photo-based maps.

As you work with these photo-based maps, you will notice that there are many sorts of map symbols employed to identify landscape features, including streams, roads, boundaries of soil delineations, soil map unit symbols (one in each delineation), section corners and numbers, and a variety of spot symbols representing small but significant features such as sinkholes, sandy spots, wet spots, rock outcrops, and so forth. In addition, around the borders of the individual maps there are map scales, township and range numbers, and other information. These symbols and other information are described and defined on the fold-out Index to Map Sheets page and/or on its reverse, which contains the Soil Legend and the Conventional and Special Symbols Legend.

Once you have determined the soil map unit symbol or symbols that are in the delineations shown for your field, you should go first to the Soil Legend (on the back side of the fold-out Index to Map Sheets) to learn the full name of the soil map unit(s) found in your field. For a description of the nature and range of soils likely to be found in areas thus mapped, read the full map unit description(s) in the text of the report.

For tabulations of various soil physical and chemical properties and of interpretations of the soil map units for different uses, peruse the tables in the report, looking especially for the soil map unit symbol(s) and name(s) that are of interest to you. Contrast them with other soils found throughout in the various contrasting regions of your county.

Remember, the purpose of the soil and land resource inventory that has been conducted and made available to you in the form of this report is to inform you and others about your lands and soils. You will discover that this soil survey report is the most complete and comprehensive inventory available of the soil and land resources of your county.

You will also learn, however, in reading the report and in comparing its contents with your own experiences and observations, that the inventory is not perfect. Soil survey reports tend to be accurate but imprecise. Intricate details of the land cannot be completely depicted and described on maps of this scale or in text of this length. You should be aware of the consequent imprecision of the maps and accompanying documentation. If you have reason to believe or suspect that the maps and/or descriptions of your land are imprecisely depicted to the point that your decisions on pesticide use will be wrong or biased as a result, contact your local Soil and Water Conservation District for assistance in determining the correct soil map unit name(s) and characteristics to use in your decision-making. Similarly, if you are in a county or area that has no published or interim soil survey, contact your local Soil and Water Conservation District for assistance in obtaining a soil survey of your land.

DEALING WITH MORE THAN ONE SOIL IN YOUR FIELD OR OTHER MANAGEMENT UNIT

When two or more soil map units are found in the field of interest, you will want to make your decisions by working up your information separately for each such map unit. Only after doing so will you be able to see whether these map units are sufficiently contrasting to justify: (1) different management decisions and practices on the various parts of the field; or (2) selection of one set of practices for the whole field, based on the more problematic, environmentally sensitive part(s) of the field, even though such practices may not be entirely necessary on the rest of the field.

Where two or more soils make up the name of one of your map units (e.g., Pedro-Jonesville complex, 0 to 5 percent slopes), a similar dual workup should be made for all the soils in every map unit in the field. Here, however, you will not have the luxury of using option " " from the previous paragraph, because the soils in a multiple-named map unit have not been delineated separately from each other. You may need to go with something like option " ", and select a management system keyed to the most limiting condition(s) found in that map unit.

RATING SOILS FOR LEACHING AND RUNOFF POTENTIALS FOR PESTICIDES

An indicator is needed to determine which of the two pathways, leaching or runoff, will be the most likely pesticide loss pathway. Selected properties of soils have been used to develop a rating system for runoff and leaching potential of soils. The USDA Natural Resources Conservation Service has rated soils according to this system in counties having published soil survey reports. If your county has a published report, you can obtain a copy of the soil ratings from either the County Cooperative Extension Service or the local USDA Natural Resources Conservation Service office. Ask for the document entitled "[*Name of your county*]: Soil Ratings for Selecting Pesticides." The following criteria were developed by the Natural Resources Conservation Service in collaboration with the Florida Cooperative

Extension Service to rate soils for leaching and runoff.

Leaching

Factors that determine the soil leaching rating are the soil permeability and the occurrence of mucky layers in the upper 80 inches of the soil, as follows:
RATING CRITERIA HIGH Slowest permeability is 6.0 in/hr or more.

MEDIUM Slowest permeability is between 0.6 and 6.0 in/hr.

LOW Slowest permeability is 0.6 in/hr or less.

Exceptions:

1. Soils with a muck or peat layer are rated **LOW**.
2. Soils with a mucky layer are rated **MEDIUM** unless the soil has a slowest permeability of less than 0.6 in/hr; then the soil is rated **LOW**.

Note: Permeability estimates needed in entering and using this table may be found in one of the tables of data in most soil survey reports. In recent reports (since about the mid-1970s), that table is usually entitled "Physical and Chemical Properties of Soils." In older reports, the same information on permeability may be in tables having a different title, such as "Estimated Soil Properties Significant in Engineering."

Runoff

The factors that determine the soil runoff rating are hydrologic group, permeability, and slope, as follows: **RATING CRITERIA HIGH** Soils in hydrologic group D in their natural, undrained state.

MEDIUM Soils in hydrologic group C; and any soils in hydrologic group B (in their natural, undrained state) that have a permeability of less than 6.0 in/hr within 20 inches of the soil surface.

LOW Soils in hydrologic class A; and any soils in hydrologic group B (in their natural, undrained state)

that have a permeability of 6.0 in/hr or greater in all of the upper 20 inches of the soil profile.

Exceptions:

1. Soils that are frequently flooded during the growing season are rated **HIGH**.
2. Soils rated **LOW** are changed to a rating of **MEDIUM** where the slope is greater than 12 percent.
3. Soils rated **MEDIUM** are changed to a rating of **HIGH** where the slope is more than 8 percent.

Note: The various hydrologic soil groups (A, B, C, D) are used to cluster soils having similar runoff-producing characteristics. The chief consideration is the inherent capacity of bare soil to permit infiltration. Native soil permeability and prior wetness are considered in assigning soils to hydrologic groups. Simplified definitions of the groups are: A—high infiltration and low runoff potential; B—moderate infiltration and slight runoff potential; C—slow infiltration and moderate runoff potential; D—very slow infiltration and high runoff potential. Some soils that have a high seasonal water table but can be artificially drained are assigned to two hydrologic groups, such as B/D — very slow infiltration and high runoff potential in the natural, undrained state, but moderate infiltration and slight runoff potential when artificially drained. The more modern soil survey reports (since perhaps the mid-1970s) are likely to have hydrologic group listings in the table entitled "Soil and Water Features." Earlier reports may show this information elsewhere or not at all. Fortunately, most users will not need such primary information, because the final workups of leaching and runoff potentials are provided by the Natural Resources Conservation Service.

The above schemes for generating runoff and leaching potential ratings for soils are offered here primarily for information, to help the reader

understand the origins of such ratings as provided by the Natural Resources Conservation Service and Cooperative Extension Service in Florida. Most users will be able to bypass these steps, because, as indicated above, listings of actual leaching and runoff ratings for every soil in a county are available from local Cooperative Extension Service and Soil and Water Conservation District offices.

SOIL RATINGS FOR USE WITH TRIUMPH® AND TEMIK® PESTICIDES

Ciba Geigy Agricultural Division and Rhone-Poulenc Ag Products have determined that product stewardship must include restrictions on application of some of their products on certain soils. These companies have worked with the Florida Department of Agriculture and Consumer Services and the Natural Resources Conservation Service in Florida to identify those soils which are particularly vulnerable to leaching of TRIUMPH® and TEMIK®. As a result of this effort, the labels or supplementary information on these products indicate the soils and conditions under which these products may be used.

For TRIUMPH®, county-specific lists of soils on which the product may be applied have been developed by the product manufacturer and are available from the County Extension Offices or the product dealers. TRIUMPH® should not be applied to soils that are not included on these lists.

In the case of TEMIK®, the product label contains a list of Florida soils which have special shallow drinking water well set-back requirements (see label for definition of "shallow well"). Labels for TEMIK® should be carefully read before using the product.

CONCLUSION

You should arrive at your decision of which pesticides to use by using leaching and runoff potential ratings for map units in combination with information derived from your soil survey report and from commodity-specific information. Commodity-specific information is given in the Extension Circulars entitled "[Crop Name]: Managing Pesticides for Crop Production and Water Quality Protection", which are companions to this

one. Special additional considerations must be given to TRIUMPH®, TEMIK®, and other pesticides that carry groundwater warnings on their labels.

Remember, there are county-specific soil ratings that you must use in formulating your pesticide-selection plan. For those counties with a published or interim soil survey, the USDA/NRCS has provided listings that show leaching and runoff potentials of map units. These ratings are contained in a fact sheet entitled "[Name of your county]: Soil Ratings for Selecting Pesticides." A copy of these ratings for your county is available from your local Cooperative Extension Service or Soil and Water Conservation District office.

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