Indiana FIELD OFFICE TECHNICAL GUIDE

Section II Natural Resources Information

Water Quantity and Quality Interpretations

Non-point Source Pollution

Water quality is important to all citizens in Indiana. Non-point source agricultural pollutants in Indiana can result from animal-waste handling and disposal, application of nutrients (both animal waste and manufactured products), the application of pesticides, and the movement of soil particles. Impacts from any and all of these pollutants occur in both surface and groundwater.

Interpretations included in this subsection include:

Soil-Pesticides Interaction Ratings	Soil Rating for Potential Soluble Nutrient Leaching Losses
Field Rating for Potential Nutrient Leaching and Runoff Losses	Pest Management (595) Mitigation Effectiveness Guide Reducing Pesticide Impacts on Water Quality

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Soil-Pesticides Interaction Ratings

Soil-pesticide interaction ratings help determine the potential for pesticide loss from surface runoff and from leaching or percolation below the root zone when a specific pesticide is used on a specific soil.

Soil and Pesticide Ranking

Soils are ranked according to potential for pesticide loss from surface runoff and from leaching. Table 1 lists the soil series, surface loss potential, and leaching potential. The surface loss potential and soil leaching potential are ranked as slight, moderate, or severe.

Potential Pesticide Losses

Pesticides are also ranked according to potential for loss to surface runoff and leaching. Table 2 is a list of pesticide properties that include the surface loss potential and leaching potential for each pesticide. The surface loss and leaching potentials are ranked as high, intermediate, low or very low.

The *runoff potential* indicates the tendency of the pesticide to move with sediment in runoff. A rating of HIGH means the pesticide has the greatest tendency to move with sediment. A rating of LOW means the pesticide has a slight tendency to move with sediment. A rating of INTERMEDIATE means the pesticide has a moderate tendency to move with sediment.

The *leaching potential* indicates the tendency of a pesticide to move in solution with water and leach below the root zone into deep percolation. A rating of HIGH means the pesticide has the greatest tendency to leach. A rating of LOW means the pesticide has a slight tendency to leach. A rating of INTERMEDIATE means the pesticide has a moderate tendency to leach. A rating of VERY LOW means the pesticide is totally used, totally decomposed, or that there is such a small amount of pesticide remaining that it is not expected to leach with the percolating water.

Both the soil rank (Table 1) and the pesticide rank (Table 2) are used to determine the potential for pesticide loss to leaching (Figure 1) or to surface runoff (Figure 2). The intersection of the soil leaching potential and the pesticide leaching potential in these matrices gives an overall leaching potential of potential 1, potential 2, or potential 3.

Potential 1 - This pesticide applied on this soil has a high probability of being lost to surface runoff or leaching. Potential 1 pesticides should be further evaluated for their hazard to humans and animals. If a pesticide is a potential danger to health, an alternative pesticide or other pest management techniques should be selected.

Potential 2 - This is an intermediate rating. This pesticide applied on this soil has a possibility of being lost to surface runoff or leaching. The effect of the pesticide on the water resource will need additional on-site evaluation.

Potential 3 - This pesticide applied on this soil has a low probability of being lost to surface runoff or leaching. This pesticide can be used according to label instructions with little hazard to the respective water resource.

Figure 1. Potential Pesticide Loss to Leaching Matrix				
Soil				
leaching	**---------- Pesticide leaching potential ----------**			
potential	high	intermediate	low	very low
Severe	potential 1	potential 1	potential 2	potential 3
Moderate	potential 1	potential 2	potential 3	potential 3
Slight	potential 2	potential 3	potential 3	potential 3

Figure 2. Potential Pesticide Loss to Surface Runoff Matrix			
Soil	**Pesticide surface**		
runoff loss			
potential	high	intermediate	low
Severe	potential 1	potential 1	potential 2
Moderate	potential 1	potential 2	potential 3
Slight	potential 2	potential 3	potential 3

Soil Rating for Potential Soluble Nutrient Leaching Losses

This section provides a way to determine the degree to which water percolates below the root zone in certain soils. Percolating water containing dissolved nitrates or other soluble nutrients could be a hazard to ground water. The method is based on a Leaching Index (LI).

For areas with ground water concerns, the LI should be determined to evaluate the potential for contaminating the ground water with soluble nutrients. The LI uses annual precipitation, hydrologic soil group, and rainfall distribution data.

Leaching Index

An LI map for each hydrologic soil group was developed for Indiana. The hydrologic group describes those soils that do not have dual hydrologic ratings because of differences in drainage. If the soil has a high LI and is over a shallow aquifer, soluble nutrients (especially nitrates) may contaminate the water.

The LI does not account for irrigation. If irrigation is applied only to supply needs, there will be little additional loss below the root zone. The additional loss would be relative to the precipitation events after the soil profile is saturated or nearly saturated due to irrigation.

In areas of marginal water quality, the amount of irrigation water applied includes a leaching fraction to insure that salts do not build in the soil. If a leaching fraction is applied this amount of water must be added to the LI.

Procedure

Follow these steps to determine the leaching index of a certain soil:

1. Find the soil's hydrologic group. (Soil Interpretation Record Sheets)

2. Locate the isoleaching map for that group of soils.

3. From the map, based on the soil location, determine the LI.

Guidelines for recommendations:

1. An LI less than 2 inches would probably not contribute to soluble nutrient leaching below the root zone.

2. An LI between 2 and 10 inches may contribute to soluble nutrient leaching below the root zone and nutrient management should be considered.

3. An LI greater than 10 inches will contribute to soluble nutrient leaching below the root zone. Nutrient management practices should be intense or soluble nutrients should not be applied. Also, consider using conservation practices that minimize infiltration, such as stripcropping rather than tile outlet terraces.

Field Rating for Potential Nutrient Leaching and Runoff Losses

Nutrient management plan development should be guided by the potential for water soluble nutrients to leach to a aquifer and for the potential for water soluble and soil-born nutrients to be transported to surface waters (Tables 1 and 2).

Field potentials for these situations can be ranked as high, medium, or low. Low or medium potential for leaching or transport will require attention to nutrient application and erosion control. High potentials will require additional nutrient management considerations beyond those needed for low and medium potentials.
