



Natural Resources Conservation Service
210 Walnut Street, Room 693
Des Moines, IA 50309-2180

Using the Leaching Index in a Nutrient Management Plan

Nutrient Management Note

The Leaching Index (LI) is an estimate of the inches of precipitation that infiltrates in a crop field and percolates to below the rootzone (1 meter). The LI was developed by the USDA Agricultural Research Service to identify fields where nitrate leaching could be a problem. It is a simpler substitute for the more complex Environmental Policy Integrated Climate (EPIC) model for use in areas of the United States with “low annual rainfall or at least low rainfall during the winter” and “medium rainfall areas that have soils with high storage capacity and low saturated conductivity values.” (Williams and Kissel, 1991). These conditions fit Iowa.

The Leaching Index is calculated using the fall and winter seasonal rainfall (Oct – Mar), the annual rainfall, and the runoff curve number (RCN) for the hydrologic soil group of the soil on the field. The Revised Universal Soil Loss Equation 2 (RUSLE2) automatically calculates the LI (see instructions below).

Leaching Index Interpretation

The leaching index is an indicator of the relative risk – high, moderate, or low – that nitrate will leach below the rootzone in a field and contaminate ground and surface water.

LI > 10 inches indicates a **HIGH risk** of leaching below the rootzone.

LI of 5 to 10 inches indicates a **MODERATE risk** of leaching below the rootzone.

LI < 5 inches indicates a **LOW risk** of leaching below the rootzone. (Pierce et al, 1991)

The Leaching Index value and interpretation – high, moderate, or low – is required for each field in a nutrient management plan. However, **no conservation planning criteria will be based on these interpretations.** It is an educational tool only.

Limitations of the Leaching Index in Iowa

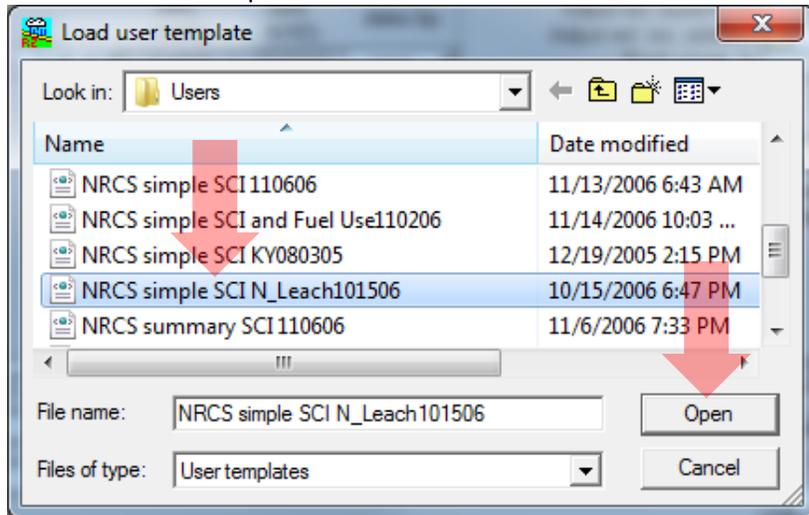
The value of the LI is limited in Iowa for several reasons. The LI is based on runoff and infiltration estimates of undrained fields and, thus, the index does not apply to tile-drained fields. The LI presumes the highest risk of percolation is October to March. The risk of leaching in Iowa is highest during April, May, and June (Helmert et al, 2005). Thus the index may be using an incorrect estimate of seasonal rainfall. The LI values have not been correlated to water quality nitrate concentration or load data, so the values cannot be used to design conservation systems to achieve specific concentration and load reductions downstream. The LI indicates that 55% of the acres in Iowa have a LOW risk, 45% a MODERATE risk, and <1% a HIGH risk of leaching occurring to below the root zone. The index’s resolution is not adequate to target conservation nor to develop different levels of conservation planning guidance based on the index.

Given the limitations cited above, the Leaching Index does not adequately assess the risk that nitrates will leach from a field in Iowa. However, ***Nitrate-N leached from cropland is a water quality problem in Iowa and, therefore, nitrogen leaching is presumed to be a resource concern on all cropland acres. For a nutrient management plan to meet the Iowa 590 Nutrient Management Conservation Practice Standard, always plan for nitrogen and consider conservation practices designed to trap nitrates.***

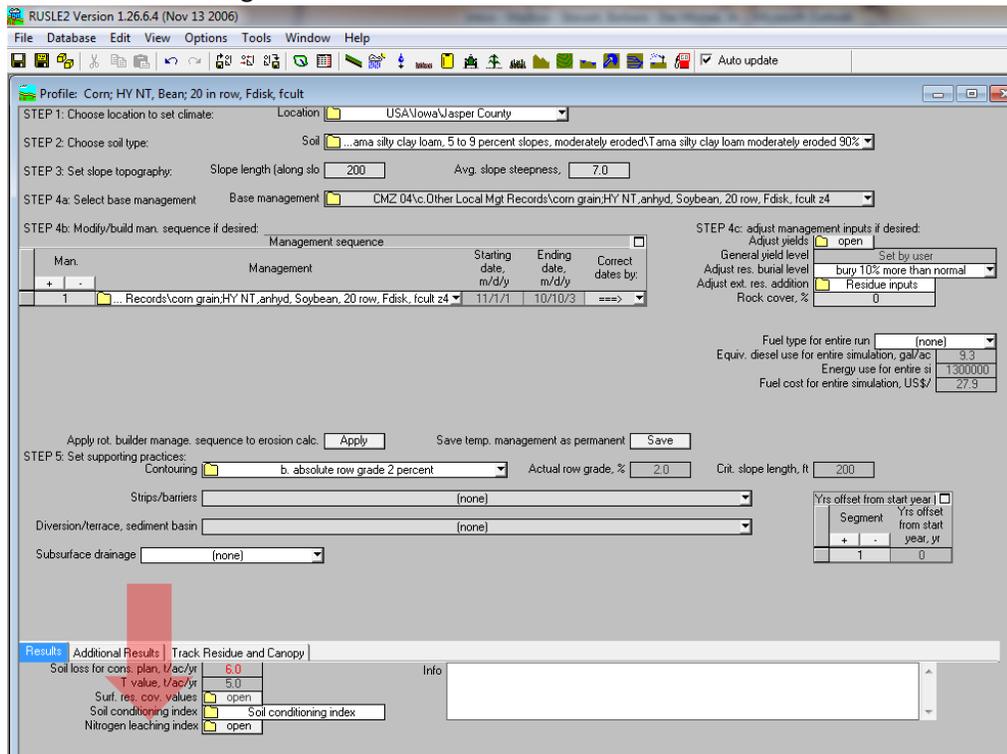
Accessing the Leaching Index in RUSLE2

The Nitrogen Leaching Index is built into the RUSLE2 program and can be accessed through the “NRCS Simple SCI N_Leach101506” template.

1. Open the RUSLE2 program
2. Click on Options/Template/Load in the top tool bar.
3. Scroll down until you find the “NRCS Simple SCI N_Leach101506” template
4. Select and open



5. In the Profile, lower left-hand corner, find the Nitrogen Leaching Index right below the Soil Conditioning Index.



References

- Helmers, M.J., P.A. Lawlor, J.L. Baker, S.W. Melvin, and D.W. Lemke. 2005. Temporal subsurface flow patterns from fifteen years in north-central Iowa. ASAE Meeting Paper No. 05-2234. St. Joseph, MI: ASAE.
- Pierce, F.J., M.J. Shaffer, and A.D. Halvorson. 1991. Screening procedure for estimating potentially leachable nitrate-nitrogen below the root zone. *In: R.F. Follet, D.R. Keeney, and R.M. Cruse (Eds.). Managing nitrogen for groundwater quality and farm profitability. Soil Science Society of America, Inc. Madison, WI. p. 259-283.*
- Williams, J.R., and D.E. Kissel. 1991. Water percolation: an indicator of nitrogen-leaching potential. *In: R.F. Follet, D.R. Keeney, and R.M. Cruse (Eds.). Managing nitrogen for groundwater quality and farm profitability. Soil Science Society of America, Inc. Madison, WI. p. 59-83.*