

Canadian Highly Erodible Land Planner  
CanHELP 3.0

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## Introduction

Soil degradation by wind and water erosion continue to affect the productivity of Prairie soils. The Prairie Farm Rehabilitation Administration (PFRA) has developed a software program to evaluate wind and water erosion losses. The Canadian Highly Erodible Land Planner, or CanHELP 3.0, has been developed as an extension tool to assist in the design of on-farm erosion control practices necessary to maintain crop residue levels. CanHELP 3.0 is useful in demonstrating the effects of tillage practices, crop rotations, and residue types on wind and water erosion. This version of CanHELP reflects a significant philosophical change in the way the two erosion equations are handled and differs dramatically from previous releases of CanHELP. The highlights of CanHELP 3.0 include:

- on-line Help at all points of the software;
- menu driven options;
- erosion factors derived from location, soil texture and cropping background information;
- ability to customize for users area;
- optional mouse controls; and
- comprehensive User and Technical Manuals.

CanHELP 3.0 is designed to calculate wind and water erosion based on the Wind Erosion Equation and the Universal Soil Loss Equation. The Wind Erosion Equation (WEQ) estimates long term annual soil erosion due to wind. The equation integrates the important factors affecting wind erosion and provides an estimate of long term average wind erosion from an area.

The Wind Erosion Equation is:

$$E = f(IKCLV)$$

where:

- E is the estimated long term average annual soil movement in tons/acre.
- I is a soil erodibility index
- K is a ridge roughness factor
- C is a climatic factor
- L is the unsheltered distance factor
- V is a vegetative cover factor

The Universal Soil Loss Equation estimates long-term average annual soil erosion due to sheet and rill erosion from slopes as a result of summer precipitation. The equation integrates the effects of precipitation and runoff, soil erodibility, slope length and steepness, cropping practices, and erosion control practices to estimate the long-term average annual erosion for a crop rotation.

The Universal Soil Loss Equation is:

$$A = R K L S C P$$

where:

- A is the average annual soil erosion in tons/acre
- R is a rainfall and runoff factor
- K is a soil erodibility factor
- L is a slope length factor
- S is a slope steepness factor
- C is a cover and management factor
- P is a support practice factor which accounts for the effects of special conservation practices on water erosion.

CanHELP 3.0 relies upon input regarding field and cropping information. CanHELP 3.0 uses this information along with data housed in the Maintenance data tables to perform the final erosion calculation. CanHELP 3.0 also acts as a residue calculator.

#### Using CanHELP 3.0

Figure 1 illustrates a typical CanHELP 3.0 erosion calculation process. An erosion calculation will involve entering field information and the cropping practices for the field under review. Editing is allowed at various stages along the process. All worked can be saved and retrieved later. Output can be displayed on the screen, or printed.

Two data entry worksheets form the basis for all CanHELP 3.0 calculations. The **Field Information Worksheet** portion of CanHELP 3.0 is intended to allow the user to describe their field situation. The information displayed on this screen describes the physical conditions such as field size, soil texture and slope of the field or area used in the erosion calculation.

The **Field Operation Worksheet** portion of CanHELP 3.0 is intended to allow the user to describe a cropping sequence. The information displayed on this screen describes management decisions such as crop rotation, crop yield, implements used and orientation of residue at erosion.

Once the two worksheets are complete, wind and water erosion calculations can be executed. The **Calculation Screen** displays the output generated; residue at erosion (lbs/acre), Small Grain Equivalence, Wind and Water per year (tons/acre) and average total Wind and Water erosion for the described cropping sequence.

The **Erosion Factors** option displays and allows editing of the wind (WEQ) and water (USLE) erosion equation factors. These are derived factors based on previous input.

In the **Maintenance** option, there are five basic data tables used to store background information required to run the WEQ and USLE. The following tables and their attributes are found in CanHELP 3.0:

**RM TABLE:** Municipality Name, Municipality #, Soil Zone, Annual R, Annual C (WEQ) and monthly C Factors

**IMPLEMENT:** Implement Type, Residue Remaining Factor  
**TABLE**

**TEXTURE TABLE:** Soil Name, Texture, Soil Zone, K Factor (USLE), I Factor, K Factor (WEQ)

**CROP TABLE:** Soil Zone, Crop conversion Factor, Oversummer Loss, Small Grain Equivalents Curve

**SLOPE TABLE:** Slope %, Critical Slope Length, I Correction Factor

### **Summary**

CanHELP 3.0 can be a useful extension package when used with a knowledge of soil science, an ability to interpret soils maps and aerial photographs, and a good understanding of local agricultural practices. Practical use of CanHELP 3.0 requires an understanding of the erosion equations. The program is for use primarily by agricultural professionals and technicians working with farmers to develop conservation measures for erosion control.

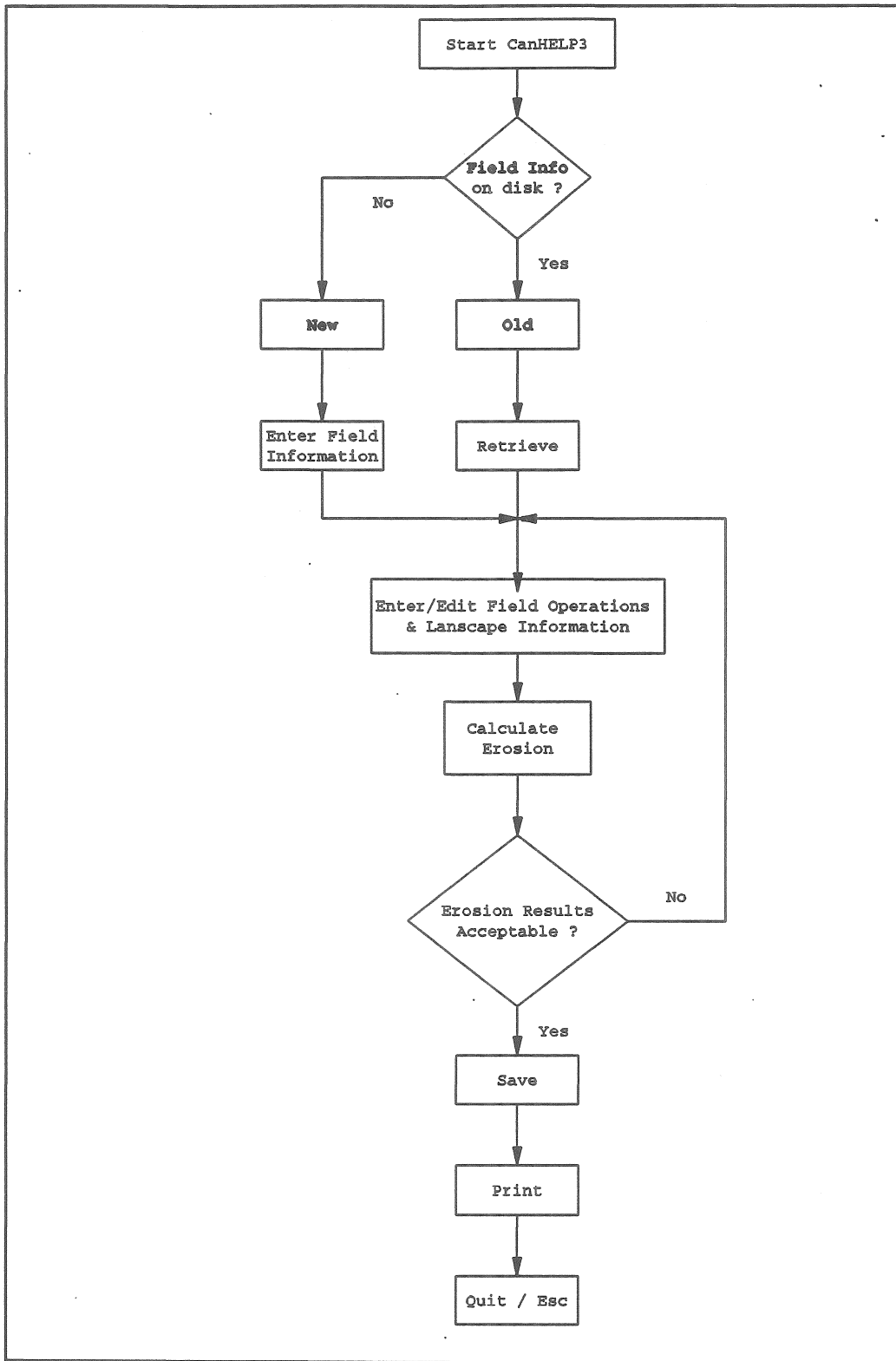


Figure 1 - Typical CanHELP Erosion Calculation