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What is the Minnesota Cooperative Soil Survey?

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What is the Minnesota Cooperative Soil Survey?

James L. Anderson, Richard L. Skarie, and Lowell D. Hanson*

Could you do a better job knowing more about the soils on your farm or those in your front or back yard?

Each year Minnesotans learn more about the varieties of crops they will plant, the animals they will raise, the fertilizers they will use, and the grass they will seed. But, often, the makeup of the soils on which these crops, animals, and grasses will be growing is forgotten or poorly understood.

Should the best farmland in the county be relegated to the site of a new airport, or a garbage dump, or a roadway, or a cemetery? Would you have bought your house if you had known saturated soil conditions occurred during wet years? Did you know that shade trees grow best in certain soils?

If your county is one of those in Minnesota that already has a soil survey, then you can find the answers to your questions by checking the Agricultural Extension Service or the Soil and Water Conservation District offices, usually located in the courthouse or ag service center. But if a soil survey hasn't been completed, it can be, with tax dollars you are already spending and a request to your county commissioners to begin it.

A Cooperative Program which is Cost Shared

The cost is shared three ways: by county, state, and federal funds. For contracts signed in a given year the per acre cost doesn't change for the life of the contract.

Five state and federal agencies are cooperating with the counties to provide these detailed soil surveys. These agencies include the Agricultural Extension Service, Agricultural Experiment Station, Forest Service, Soil Conservation Service, and Soil and Water Conservation Board.

Table 1. Cost formula for funding soil survey

	County	State	Federal
		%	
All land privately owned	33.3	33.3	33.3
50% state land	25.0	50.0	25.0
20% state land 10% federal land	23.5	39.9	36.6

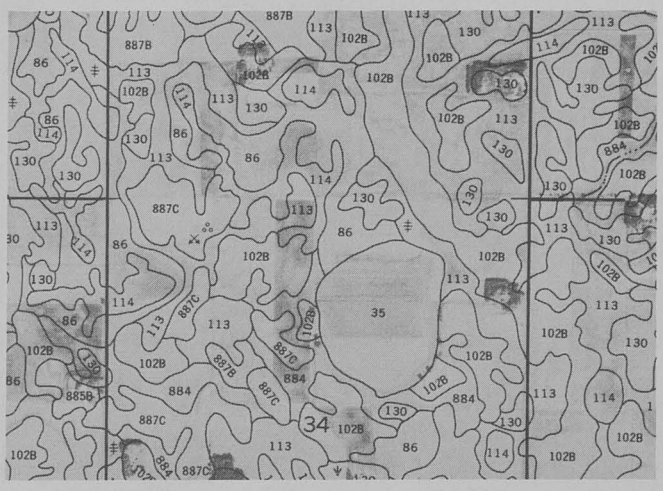

Figure 1. This is a small section of a soil survey map.

Figure 2. This is the soil landscape, represented by figure 1, viewed from ground level.

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Figure 3. A significant agricultural use of the soil survey information is to determine the suitability of reduced tillage systems.

County funding of the survey is based on the premise that county residents will receive direct and indirect benefits from the completed survey. Soil surveys permit more efficient management of land whether for agriculture, forestry, recreation, or urban uses. By incorporating soil properties into management decisions the full potential of the land may be realized.

Soil Maps

Soil atlases covering the entire state are already available and portray soil areas to within a square mile. But the detailed Minnesota Cooperative Soil Survey is in larger scale and shows soil areas to within 3-5 acres in southern Minnesota and to within 7-10 acres in northern Minnesota.

Surveying of farmland is scheduled so that it does not interfere with farming operations. An individual member of a soil survey crew can map 640 acres a day depending on the terrain. The average acreage mapped in a day varies between 300 to 1,000. Except for an earthquake or a Mount St. Helens, the soil patterns simply do not change drastically; therefore, the survey conducted today will be useful for a number of years.

A soil survey has both agricultural and nonagricultural interpretations. In the future, recommendations for fertilizer, tillage, herbicide use (probably viewed on a computer screen) will be related to soil mapping units, just as soil loss estimates are now related to soil types. Soil texture, drainage, permeability, pH, and landscape position are some of the soil properties included in the classification and interpretation.

Essentially, a soil survey covers the following:

- giving a name to each soil (soil series)
- plotting the location of each soil on maps
- grouping soils with similar characteristics which affect management (percent organic matter, natural drainage, texture, chemical properties)

Soil maps provide a systematic way of organizing and transferring soils information from one area to another. Soils are complex and a given soil's characteristics vary somewhat. But, within a definable range, a Hubbard sandy loam mapped in Anoka County is the same as one mapped in Stearns County. Features of a given soil can be recognized and behavior is predictable. An example of a management decision would be whether, following corn, the soil should be fall tilled with a moldboard plow or whether chisel plowing in the spring is an equally promising alternative.

Soil Interpretations

Here are just some of the agricultural interpretations possible from a soil survey:

- Erosion control needs
- Crop equivalent ratings (productivity ratings)
- Soil management (tillage, drainage, herbicide application)
- Crop suitability and adaptability of new varieties
- Irrigation suitability or need
- Forest production and harvesting procedures

The nonagricultural uses, equally important, include the following:

- Planning and zoning (indicating areas such as wetlands and prime cropland)
- Treatment of septic tank effluent
- Highway and powerline routing
- Equitable land valuation for tax assessment
- Location of outdoor recreation facilities

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Figure 4. An urban use of the soil survey is to indicate site suitability for on-site waste treatment systems.

More than Soil Maps and Interpretations

For an average sized county in Minnesota of 500,000 acres, 4 to 5 years are required to complete a soil survey. There is a lot more to it than the actual mapping by soil classifiers walking the landscape taking soil borings.

Before any lines are drawn on the map, a work plan is prepared by the leader of the survey party. This sets down the needs and objectives of the survey, determined by a group including local users and landowners together with the cooperating agencies. This is when the map scale is selected and the type and size of the mapping units determined. Table 2 indicates the possible scales.

Table 2. Soil borings and minimum map unit size

Map scale	Minimum map unit/acres
1:50,000 (1" = 4,000')	15-20
1:20,000 (1" = 1,667')	5-7
1:15,840 (1" = 1,320')	2-3

While the survey is in progress a series of field reviews are also going on. This is to insure that the survey meets standards of the National Cooperative Survey and the mapping units adequately represent the occurrence of soils on the landscape. Soil scientists from the University of Minnesota, Soil Conservation Service, and the Forest Service conduct the reviews. Local professionals are encouraged to participate as are representatives of the Department of Natural Resources, Geological Survey, and Pollution Control Agency.

Are soil surveys new? Not at all. China classified soils according to color and structure more than 4,000 years ago. The first soil maps and text in the United States were published in 1900 and 3 years later Minnesota's first soil survey was completed in Lyon County.

The goal of the present Minnesota Cooperative Soil Survey is to have all 87 counties with soil maps by 1990.

If local information is not available on the soil survey status of your county, information can be obtained in writing from:

University of Minnesota
Department of Soil Science
1529 Gortner Avenue
St. Paul, MN 55108

The use and interpretation of soil surveys is discussed in the following publications:

- Locating On-Site Home Sewage Treatment Systems, Extension Folder 522 – 1980
- Crop Equivalent Rating Guide. Miscellaneous Report 132 – 1975
- Crop Equivalent Rating, Soils Fact Sheet 34 – 1980
- Tillage: Its Role in Controlling Soil Erosion by Water, Extension Folder 479 – 1979

which may be requested from local county extension offices or from the Bulletin Room, 3 Coffey Hall, 1420 Eckles Ave., University of Minnesota, St. Paul, MN 55108.

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