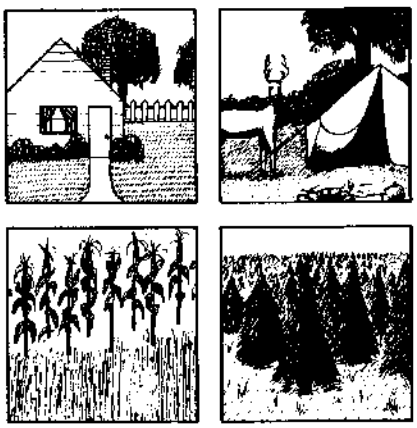

Soil Survey Reports

FARM MANAGEMENT

By G. Lemme and W. Cook***
MSU Contact: D. Mokma, Dept. of Crop and Soil Sciences

Extension Bulletin E-1588, February 1982
COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY

Introduction

This bulletin is one of a series dealing with the use of soil survey information for wise resource management. If you are unfamiliar with the type of information included in a soil survey report or with how to locate a parcel of land on the soil maps, refer to *Soil Survey Reports: Using Available Information (E-1586)*, or refer to the inside cover of a soil survey report printed after 1978. Bulletins dealing with soil survey information for other uses are available from your local Cooperative Extension Service office.

The Ingham County Soil Survey Report has been used as an example soil survey report throughout this series of bulletins. For definitions of unfamiliar terms, consult the glossary of technical terms found in the soil survey report.

Information on climate, relative soil productivity, water management, and some physical and chemical properties of the soils found in an area is important when developing a farm management plan or evaluating agricultural land. Soil management is a three phase process that involves information gathering, information synthesis, and decision making. A soil survey report is a valuable source of information during the first two phases of this process. Soil maps are particularly valuable when evaluating a parcel of land with which you are not personally familiar. A soil scientist has already walked over the land and delineated on his map various major soil and slope differences. This may serve as a preliminary inventory of soil resources or a guide to a more effective onsite investigation of the parcel of land being evaluated. Other soil survey report information valuable in farm management is discussed below.

Climate

Long term average climatic information for the county is given in soil survey reports. Monthly average daily temperature, plus daily maximums and minimums are given. Temperature extremes, both minimum and maximum, that are exceeded two years out of ten are also given. The average number of growing degree days are equivalent to "heat units." Growing degree days during a month accumulate by the amount that the average temperature each day exceeds a base temperature (50°F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall. Corn hybrids are commonly rated by their growing degree day requirement to reach maturity.

Average monthly precipitation, inches of snowfall, and the number of days with 0.10 inch or more precipitation are also included in soil survey reports. Variability in precipitation is expressed as the highs and lows expected in two out of ten years. The dates on which freezing and lower temperatures are expected and their probability are also given. For example, in Ingham County one year in

*Formerly at MSU; currently with South Dakota State University.
**Retired.

ten, the last freezing temperature (32° F or lower) will occur later than May 25, and the first freeze will occur earlier than September 22. The dates on which these temperatures are expected are also given for two out of ten years and five out of ten years.

The number of days during the year when certain minimum temperatures are exceeded are given for several probabilities in soil survey reports. These climatic data are valuable if you are unfamiliar with the area or evaluating the suitability of certain plant species for a location.

Soil Productivity

Soil survey reports include the average yields per acre that can be expected of the principal crops under a high level of management. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil.

The estimated yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties are also considered.

The yields are estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields are estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. Some farmers will be obtaining average yields higher than those given in the soil survey report.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides the following: 1) Drainage, erosion control, and protection from flooding; 2) the proper planting and seeding rates; suitable high-yielding crop varieties; 3) appropriate tillage practices, including time of tillage and seedbed preparation and tillage when soil moisture is favorable; 4) control of weeds, plant diseases, and harmful insects; 5) favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; 6) effective use of crop residues, barnyard manure, and green-manure crops; 7) harvesting crops with the smallest possible loss; and 8) timeliness of all fieldwork.

The estimated yields reflect the productive capacity of the soils for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those given in soil survey reports are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service, Soil Conservation District, and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Technological advances in agricultural production methods cause the yield figures found in a soil survey report to become outdated over time. The relative yield differences among soils, however, will continue to exist even though the yields obtained on the soils have increased.

Yields per acre for some of the common crops of Ingham County are found in Table 1-A for Aurelius muck and Sisson fine sandy loam, on two-to-six percent slopes and six-to-12 percent slopes. If you wish to use a personal sample, fill in the information in Table 1-B for those crops in which you are interested.

Table 1-A. Yields per Acre of Crops and Pasture

Soil Map Symbol	Corn	Oats	Winter Wheat	Soybeans	Grass Legume Hay
	bu	bu	bu	bu	Ton
Au	70	--	--	22	--
SnB	105	80	50	35	4.0
SnC	90	70	47	32	3.6

Absence of a yield figure indicates the crop is seldom grown or is not suitable.

Table 1-B. Yields per Acre of Crops and Pasture Personal Example

Soil Map Symbol	Crop 1	Crop 2	Crop 3	Crop 4	Crop 5

Water Management

Many soil properties and site features that affect water management practices have been identified in the soil survey. Soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; and availability of outlets for drainage.

Irrigation is affected by such features as slope; susceptibility to flooding; hazards of water erosion and soil blowing; texture; depth of root zone; rate of water intake at the surface; permeability of the soil below the surface layer; available water capacity; need for drainage, and depth to the water table.

Artificial drainage and irrigation are common water management practices that are influenced by the soil properties. The soil features identified as restrictive vary, as does the difficulty and cost of overcoming this limitation. The Soil Conservation District, Soil Conservation Service, Cooperative Extension Service, or commercial firms should be consulted when planning either a drainage or irrigation system.

Table 2-A. Water Management

Soil Map Symbol	Drainage	Irrigation
Au	Floods, excess humus, frost action	Floods, soil blowing, wetness
SnB	Not needed	Soil blowing
SnC	Not needed	Soil blowing, slope

Features influencing drainage and irrigation on two of the soils found in the example area are shown in Table 2-A. Fill in this information for the soils found on your personal example area in Table 2-B.

Physical and Chemical Properties

Estimated values for several soil characteristics and features that affect behavior of soils are given in soil survey reports for each major horizon, at the depths indicated, in the typical pedon or representative profile of each soil. The estimates are based on field observations and on test data for these and similar soils.

Available water content is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are organic matter content, soil texture, and soil structure. Shallow rooted plants are not likely to use the available water from the deeper soil horizons.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting crops, ornamental plants, or other plants to be grown, and in evaluating soil amendments for fertility. Soil reaction of the surface horizon of cropland will vary depending on past management. Soil test samples are required to determine the pH of the soils in a field and the lime requirements.

Organic matter content is given as a range for the surface horizon. The actual value found in a particular field will vary with past management. Generally, the organic matter content of soils increases as the natural drainage becomes poorer. Differences are equalized in time with installation of artificial drainage. Soil test samples are required for fertility recommendations.

Consult a soil map of an area prior to soil sampling for fertilizer and lime recommendations. Differences in soils and topography shown on a soils map, combined with the history of past management, is useful in selecting uniform sampling areas. See *MSU Extension Bulletin, E-498* for further information on collecting soil samples.

An example of using soil physical properties for farm management planning is shown in Table 3-A.

Table 2-B. Water Management
Personal Example

Soil Map Symbol	Drainage	Irrigation

The available water holding capacity of two common agricultural soils in Ingham County are evaluated for corn production. Table 3-B provides a framework for evaluating an example of your choice.

Table 3-A. Root Zone Available Water Holding Capacity Total Crop Rooting Depth = 36 inches

Soil Mapping Symbol	Soil Horizon Depth (in.)	Available Water Capacity (in. of water/in. of soil)	Available Water Holding Capacity of Horizon
OsB	0-16	0.10-0.15	1.60-2.40
	16-34	0.12-0.19	2.16-3.42
	34-36	0.06-0.08	0.12-0.16
			Total 3.88-5.98 in.
RdC	0-18	0.13-0.15	2.34-2.70
	18-36	0.16-0.18	2.88-3.24
			Total 5.22-5.94 in.

Table 3-B. Root Zone Available Water Holding Capacity Personal Example

Soil Mapping Symbol	Soil Horizon Depth (in.)	Available Water Capacity (in. of water/ in. of soil)	Available Water Capacity of Horizon

MICHIGAN STATE UNIVERSITY
COOPERATIVE EXTENSION SERVICE

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8, and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Gordon E. Guyer, Director, Cooperative Extension Service, Michigan State University, E. Lansing, MI 48824

1P-7.5M-2:82-WP-KMF, Price 20¢, Single Copy
Free to Michigan Residents