A Guide for Land Judging in Michigan
Michigan State University Extension Service
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NOTE

The charts on pages 5 (texture); 7 (color); 8 (slope); 10 (type of slope); and 11 (erosion), are taken from the score card used in Michigan land judging contests.

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GUIDE FOR LAND JUDGING IN MICHIGAN

*by R. G. Hill and L. J. Braamse**

THE STUDY OF LAND, its misuse and its conservation is becoming more and more important to all of us.

Land is defined as the solid part of the earth surface plus water, vegetation, temperature, and light.

There is no surplus of high-quality agricultural land. Such land helps the *farmer* produce a large quantity of high-quality food and fiber for a long period of time with low investments in money and labor. High-quality land, used properly, may also mean lower prices to the *consumer.*

Man often reduces the value of his land by over-cropping and by leaving fields open to erosion. He can avoid this by *using* land within its capability, *protecting* it from deterioration, and continually trying to *improve* its productivity.

Expanding non-farm uses present still another problem. Fertile soils cannot produce agricultural goods when occupied by factories, highways, subdivisions and other such developments.

Use or management often varies from one type of land to the next. The desired use depends largely on how the land was formed by natural processes, as man cannot greatly change most of the earth's features. These features may be good or bad, depending on the intended use. We need to learn how to take advantage of the good features and overcome or live with the bad ones.

In judging land, we:

- inventory land conditions.
- appraise these conditions in terms of long-time, safe intensive land use.
- decide on the management treatment needed.

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The original manuscript, "A Guide for Land Judging in Michigan," was prepared in 1955 by Frank Trull, a former Extension Specialist in Soil Conservation. The authors express appreciation to W. S. Harrison, Department of Resource Development; Ivan Schneider, Soil Science Department; William Tedrick, 4-H Club Department; Robert George, Department of Fisheries and Wildlife, all of Michigan State University; C. A. Engberg, U. S. Soil Conservation Service; and Clifford Haslick, Vocational Agriculture Education, Michigan Department of Public Instruction, for their valuable suggestions in this revision.

Land judging requires close attention to such land characteristics as surface formations; soil factors; degree of erosion; steepness, length and direction of slope; and drainage. Weather factors—precipitation (rain and snow), sunshine, humidity and wind—are also important.

JUDGING LAND

Land judging involves appraising the important soil conditions and combining them into units or groups that can be safely used and managed for production of the wide range of plants and animals that grow in Michigan. These decisions depend on many factors such as the texture of the soil profile, steepness of slopes, amount of erosion, drainage problems and stoniness.

We need to look both into the soil and at its surface to determine all of the soil's physical properties. The characteristics covered in Part I of the land conservation score card will provide information about the soil's strong and weak points. We determine this by the texture of the surface layer and subsoil; the color of the surface layer and subsoil; the length, steepness, and type of slope; and the amount of erosion that has taken place.

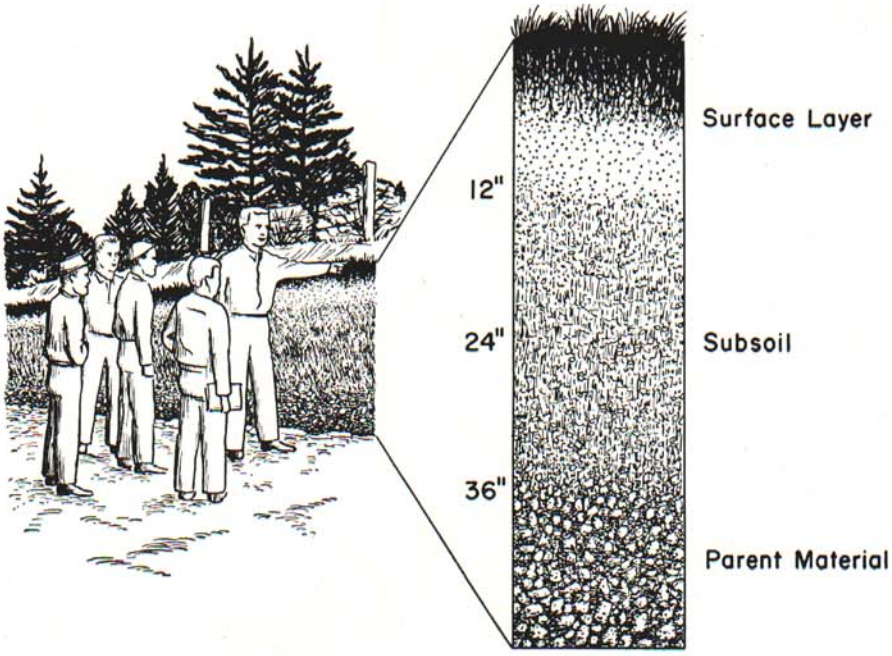


Fig. 1.—A soil profile looks like this.

SOIL PROFILE

A soil profile is the vertical cross section of the soil through all its horizons or layers as observed when you dig a pit, or look at a road bank or an excavation for a building. The profile has three main parts:

(1) **The surface layer** contains most of the organic matter and furnishes the most favorable conditions for soil organisms and chemical activity. In cropped areas it represents the plow layer.

(2) **The subsoil** usually has the finest sized soil particles and ranges in thickness from thin bands to a foot or more in depth. It is important from the standpoint of nutrient- and water-holding capacity.

(3) **Parent material** is the material from which the soil is formed. This layer is not now considered in the land judging score card. Fig. 1 shows how these three layers appear in a profile.

PART I: PHYSICAL FEATURES OF THE LAND

The "Michigan Land Conservation Score Card" has been developed to guide people through the many considerations needed to determine the safest intensive land use.

Texture

Soil texture is very important in land judging. Texture, in combination with soil structure, indicates how well the soil will absorb water, hold moisture, store and release plant nutrients, and how easily is can be tilled. Surface layer and subsoil textures are important. People are coming to realize that texture and structure of the parent material are important, especially for trees and other deep-rooted plants.

TEXTURE OF SURFACE LAYER (5 points)	TEXTURE OF SUBSOIL (5 points)
FINE Clay, clay loam, silty clay loam, sandy clay loam	
MEDIUM Silt loam, loam, fine sandy loam	
MODERATELY COARSE Sandy loam, loamy sand	
COARSE Sand	
ORGANIC Mucks and peats	

Texture refers to the size of the soil particles. Nearly every Michigan soil includes a combination of sand, silt, and clay particles. The percentage of these particles present determines texture of a soil. See Fig. 2.

In land judging, we depend upon feel to determine the textural group. One of the most reliable field methods is to rub a small amount of moist soil between the thumb and forefinger. The soil should be moist, making it possible to more readily estimate the clay content. Clay is sticky, silt is "floury" and sand is gritty.

Definitions of textures

1. Fine-textured soils are the clays, clay loams, silty clay loams, and sandy clay loams. They are made up mostly of clay and silt but sandy clay loams contain a noticeable amount of sand. They are sticky and plastic when moist. They can be formed into a ribbon when pressed between the thumb and forefinger.

2. Medium-textured soils are the silt loams, loams, and fine sandy loams. Silt loams have more than 50 percent silt particles. Loams are made up of about equal parts of sand, silt, and clay. Fine sandy loams have over 50 percent fine sand particles with enough silt and clay to make it hold together in a mold when moist.

3. Moderately coarse-textured soils are the sandy loams and loamy sands. They are made up mostly of different sized sand particles.

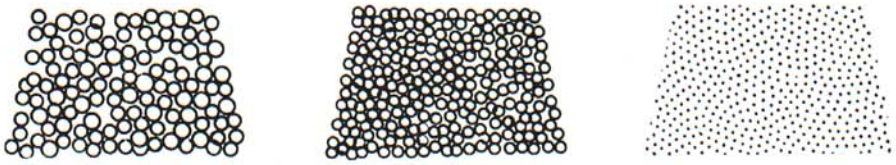


Fig. 2.—Soils contain individual particles or soil grains. Usually soils have different combinations of the three sizes—sand, silt, and clay. The combination of these is referred to as soil texture. The figures above refer to the average diameter of particles. There are 25.4 millimeters (mm.) in one inch).

Clay and silt particles make up less than 20 percent of the total. These soils are difficult to mold.

4. Coarse-textured soils are the sands. They contain over 85 percent sand particles. They have a coarse, gritty feel when moist. Even when they are moist, one has difficulty making them into a stable mold.

5. Organic soils are the mucks and peats. They are made up largely of fibrous and woody materials.

Color

Color is one of the most noticeable characteristics of the soil. The color of both the surface soil and subsoil are used in land judging.

The surface soil color indicates the amount of organic matter. It also shows natural drainage condition under which the soil was formed.

Subsoil colors are an indication of natural drainage conditions under which the soil was developed. They also show how freely air

and water move through the soil, which helps one decide if artificial drainage is needed. Subsoil color is less affected by organic matter than is the surface color.

Soil colors should be determined when the soil is moist, as they don't show up very well in dry soils.

Color of surface layer

1. Dark—Dark brown and black colors indicate high organic matter content and that the soil probably was formed under wet conditions. In general, the darker the color the higher the organic matter content in the surface layer.

2. Medium—Medium colored soils indicate a moderate organic matter content. Many of our well-drained and imperfectly drained soils of medium and fine textures fall in this color group.

3. Light—Light colored soils are low in organic matter. Well-drained, sandy soils are generally light colored. Common colors are light gray, pale yellow, or pale brown.

Color of subsoil

1. Bright—Solid red, yellow or brown colors predominate. These bright colors indicate that the soil was formed under good natural drainage conditions. Artificial drainage is not needed for general farming.

2. Mottled—Mixed yellow and brown colors with some grays. Rusty brown and orange colored spots may be present. These spots indicate that the soil was formed under fair (imperfectly drained) drainage conditions. Artificial drainage is usually needed to grow field crops.

3. Dull—Gray colors prominent with some rusty brown and orange spots. Soil was formed under poor drainage conditions (high water table). Artificial drainage is necessary if soil is to be farmed.

COLOR OF SURFACE LAYER (5 points)
☐ **DARK** — High organic matter content, very dark brown or black
☐ **MEDIUM** ☐ — Moderate organic matter content, gray or grayish brown
☐ **LIGHT** ☐ — Low organic matter content, light gray, pale yellow or pale brown
COLOR OF SUBSOIL
☐ **BRIGHT** — Solid red, yellow or brown colors predominate. Indicates artificial ..drainage usually not needed..
☐ **MOTTLED** — Mixed yellow and brown colors with some grays. Rust brown and orange spots are common. Indicates artificial drainage usually needed if cropped
☐ **DULL** — Grays predominate with some rust brown spots. Indicates artificial drainage most always needed if cropped

Slope

Slope of land is important in land use. It influences the speed with which water runs off a field and the amount of soil the water carries. Slope also affects ease of cultivation and the use of farm machinery.

Three factors must be considered to evaluate slope:

1. Steepness (Measured in percent)
2. Length
3. Type or pattern

Steepness and length are most important from the standpoint of water erosion. Using farm machinery is difficult and expensive on slopes over 12 percent.

On the land conservation score card, only steepness and pattern are judged. However, the length of slope is important in choosing the best land use and the best soil management practices. Long regular slopes up to 18 percent are adapted to contour tillage and strip cropping. It is difficult to use terraces on slopes greater than 12 percent. All contour practices are difficult to manage on short, irregular slopes.

SLOPE Steepness (5 points)
☐ NEARLY LEVEL 0-2 ft. fall in 100 ft.
☐ GENTLY SLOPING 2-6 ft. fall in 100 ft.
☐ MODERATELY SLOPING 6-12 ft. fall in 100 ft.
☐ STRONGLY SLOPING 12-18 ft. fall in 100 ft.
☐ STEEP 18-25 ft. fall in 100 ft.
☐ VERY STEEP Over 25 ft. fall in 100 ft.

Percent of slope refers to the number of feet of rise or fall in a 100-foot distance. Assuming the same cover conditions, the speed of water run-off increases with the steepness of slope. Also the quantity of soil lost becomes greater. In addition, sloping land is more hazardous and costly to work.

In land judging, slope is measured by using an Abney level, a "slope finder" or other hand levels. See Fig. 3 and 4.

It is easy to misjudge slopes, so checking with a level is necessary to determine percent of slope for the land area. In some contests, a specific slope is designated as representative of the land area. In other contests the average of all slopes may be required. Contestants should be prepared for both situations.

The slope finder (Fig. 3) has been used extensively in Michigan contests. It is inexpensive to make and is accurate enough for land judging. The slope finder sheet (page 14) should be glued to a smooth

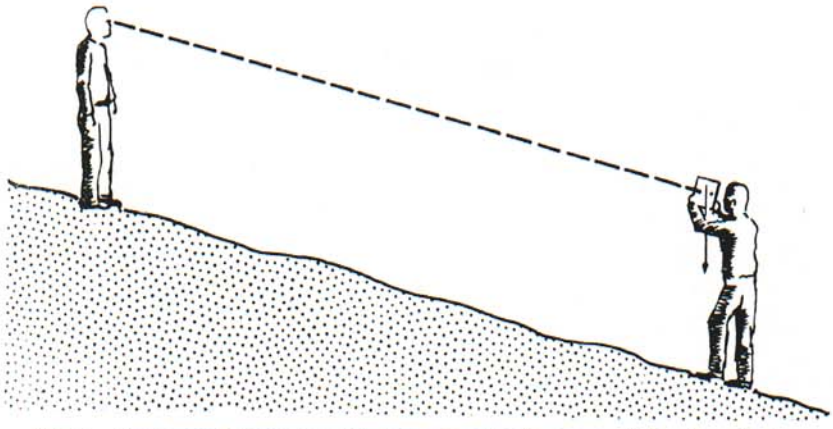


Fig. 3.—Two people working together make the best use of the slope finder.

board that is ¾" thick. A thick board is recommended so that nails used to hold the string and for sighting are securely attached and will stay in position. If possible two people should work together as follows:

1. Determine your eye level on your co-worker and use it in sighting.
2. One should stand at the top and the other at the bottom of the slope.
3. It is not necessary to measure or pace off a given distance. The readings are made directly on the scale from either the top or bottom of the slope.
4. Be sure the string with weight swings free from the board and is not affected by wind.
5. Make your reading and double check with your co-worker. Some time may be saved if each member has a slope finder.

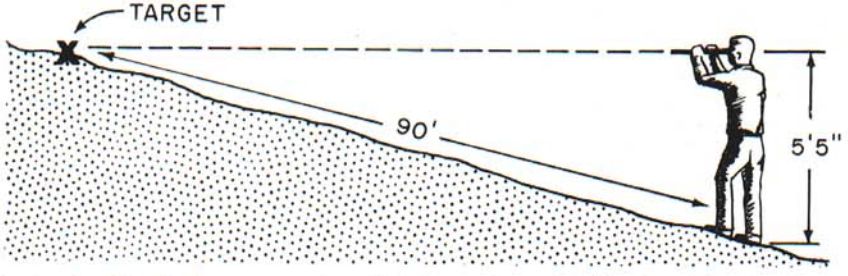


Fig. 4.—In this sketch, percent slope is being estimated with a hand level. The man has established that his eye or line of sight is 5.5 feet above the ground when he stands erect. He sights uphill through the level to an object which he has placed on the ground for a target. He watches the bubble in the level and adjusts his position up- or downhill until he has established a level line of sight. Then he paces to the target and finds the distance to be 90 feet. Then $5.5 \div 90 \times 10 = 6.1$ percent slope.

In Michigan the following six different slope ranges are used in land judging:

Slope Group	Percent Slope	
Nearly level	(0-2)	less than 2 ft. fall in 100 ft.
Gently sloping	(2-6)	2 to 6 ft. fall in 100 ft.
Moderately sloping	(6-12)	6 to 12 ft. fall in 100 ft.
Strongly sloping	(12-18)	12 to 18 ft. fall in 100 ft.
Steep	(18-25)	18 to 25 ft. fall in 100 ft.
Very steep	(Over 25)	more than 25 ft. fall in 100 ft.

Type of Slope

TYPE OF SLOPE (5 points)
☐ Regular (uniform, simple, smooth slopes)
☐ Irregular or uneven slopes (sharp, complex, overlapping slopes)

Slope length and slope type are extremely important in selecting crop rotations and soil conservation practices. Long gradual slopes up to 12 percent are easy to farm, and they can handle row crops with strip cropping and other soil conserving practices. See Fig. 5 below.

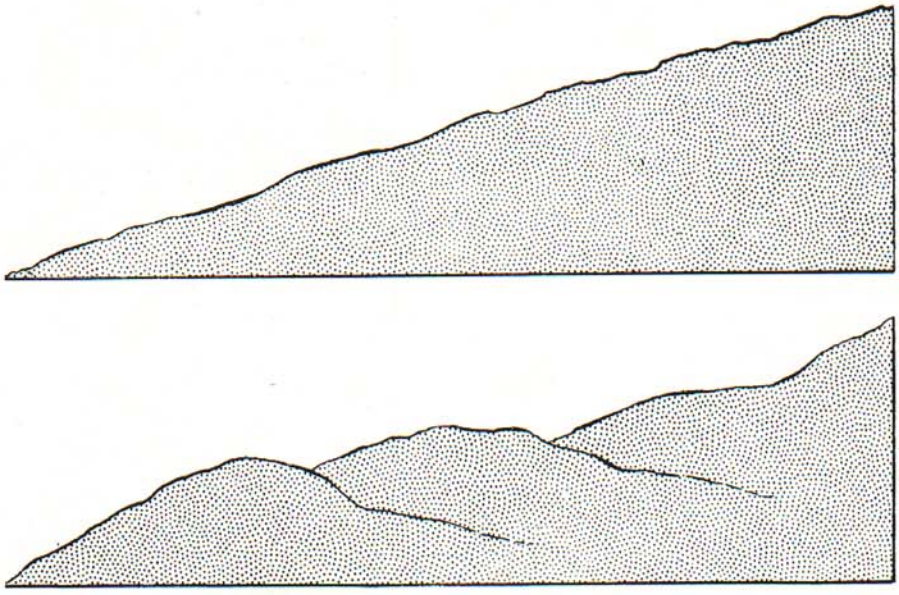


Fig. 5.—Slope patterns: Top, regular-smooth-uniform; Bottom: Irregular-rough-wavy.

On irregular slopes, it is difficult to use contour practices as strips tend to be short with many point rows. In such cases, it is better to choose other land uses that do not require contouring.

On the score card, the slopes are classified as *Regular* or *Irregular*. The land judge selects the most appropriate type for each land area.

Erosion

Erosion is important in land appraisal. Research results have proved that present and past erosion reduce resistance to future erosion. Extra care is required in selecting crop rotations and soil conservation practices on eroded land.

EROSION Based on Present Surface Layer (5 points)
☐ **SLIGHT** Mainly original surface soil
☐ **MODERATE** Mixture of original surface soil and subsoil
☐ **SEVERE** Mainly subsoil. May have gullies or blowouts
☐ **VERY SEVERE** Severely gullied or deep blowouts

Erosion is not easy to recognize and classify on many Michigan farms. Often the original surface layers were thin and have been mixed together by plowing. It is sometimes necessary to compare an original soil profile with the present surface layer to determine the amount of material that has eroded.

In the early stages of erosion, small amounts of soil are removed from the surface by wind or water. The gradual removal of surface soil is known as sheet erosion and can go undetected for a long time. It is relatively easy to observe small rills when they are first formed. After fields are worked, the rills are filled and the evidence is erased. Many people do not recognize erosion until the gully or blow-out stages are reached. When gullies occur, water erosion has reached the critical stage.

Serious erosion does not always occur on sloping land. Slopes may not show water erosion if they have had a protective cover of trees or grass and have not been cropped. Moreover, severe wind erosion occurs on many nearly level areas.

The four erosion groups used on the Michigan land conservation score card are:

1. **Slight**—All, or nearly all, the original surface soil is present.
2. **Moderate**—Mixture of original surface soil and subsoil.
3. **Severe**—Mainly subsoil, gullies or wind blow-outs may be present.
4. **Very Severe**—Severely gullied or deep wind blow-outs.

PART II: PROBLEMS THAT AFFECT THE USE AND TREATMENT OF THE AREA

Nearly all Michigan farms have problems when used and managed for high crop production. The harder the fields are used, the more difficult it is to overcome soil conservation problems. In land judging, it is important to detect these problems as early as possible. The items in Part I of the score card show the important soil properties.

A combination of: (1) Medium-textured surface soil and subsoil; (2) medium-colored surface soil; (3) bright or mottled subsoil; (4) nearly level land; and (5) slight erosion indicates a land area with excellent farming possibilities and few hazards for sustained intensive use.

In Part II, the land judges select the most serious problems or limitations for use and conservation of the land area. As listed in Part II, these are:

1. Poor soil structure
2. Droughty
3. Stony
4. Uniformly poor drainage
5. Wet spots
6. Seasonal flooding
7. Too steep for equipment
8. Wind erosion
9. Water erosion
10. Low organic matter

Recognition of the major problems is important in determining land-use capability, most intensive safe land use, and needed conservation practices.

PART III: LAND CAPABILITY CLASSIFICATION

Land use capability is a system developed by the Soil Conservation Service of the United States Department of Agriculture. It classifies land according to its most suitable use and the treatment it needs in view of any hazards or limitations to its sustained use.

Eight land use capability classes are recognized (Fig. 6). The various classes are based on the degree of hazard encountered in use. They may be divided into two broad groups. The first four classes (I-IV) are best suited for cropland; the last four classes (V-VIII) are better suited to permanent vegetation. The present vegetative cover and presence or absence of artificial drainage does not influence land use capability class.

HOW TO MEASURE SLOPE

(Four Steps)

1. Mount "Slope Finder" sheet on a 9 x 12 inch board. (Use ½-inch thick plywood or ¾-inch thick lumber.)

2. Place three (3) "finishing nails" at points shown. Hang string from top nail. Attach a weight, such as a large nut to bottom of string. Let the bottom of the string, with the nut, hang about 2 inches below the scale.

3. When measuring slope, sight at a point that is the same height as your own eye-level. It is best to work as a team with a boy or girl about your same height.

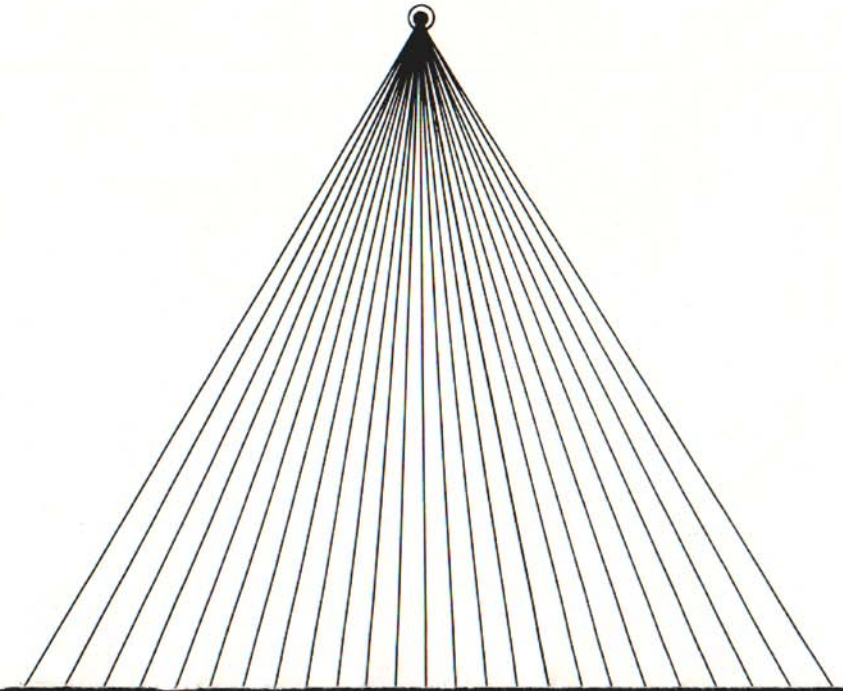
4. Hold Slope Finder as steady as possible. After you have sighted properly, pinch the string against the scale. Read percent slope, or number of feet fall in 100 feet, directly from the scale. Record this measurement.

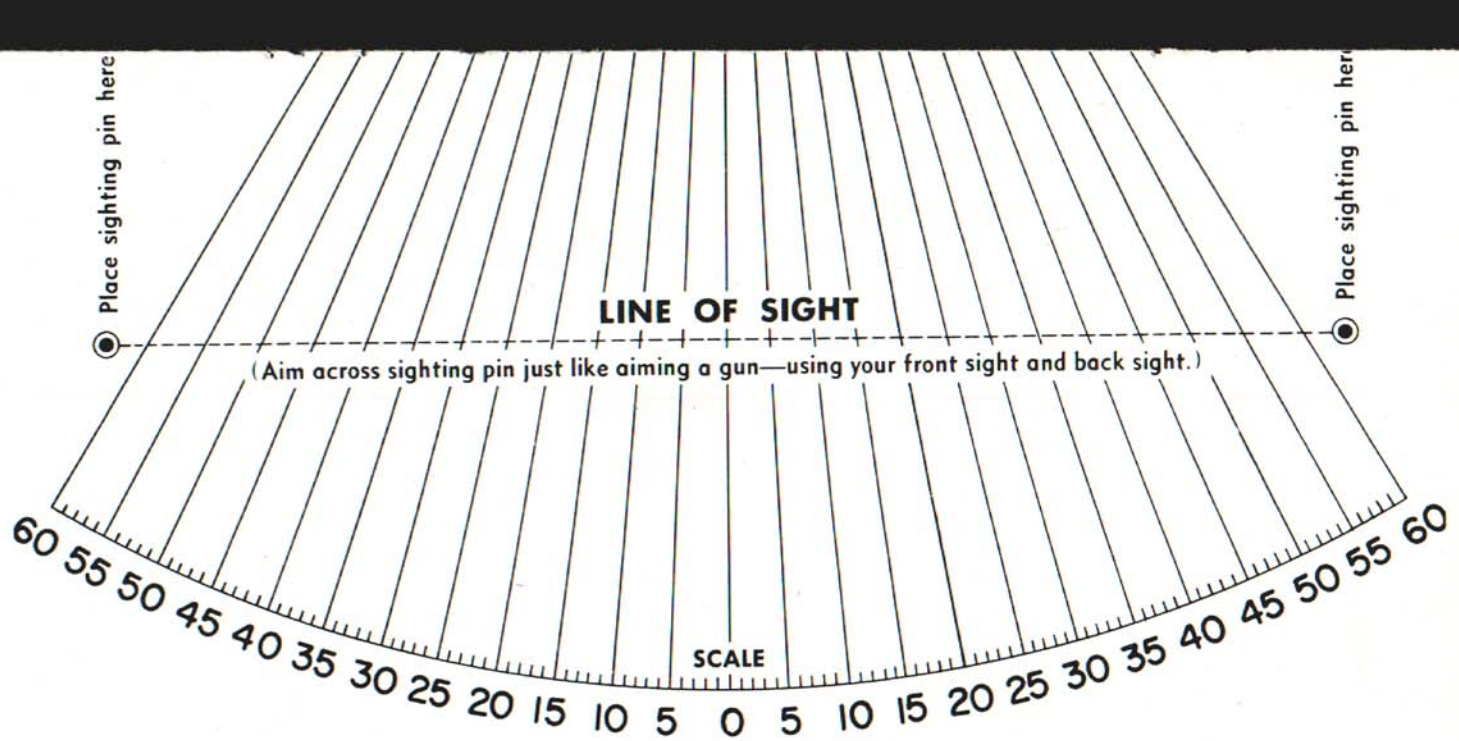
   NOTE: Using this simple "Slope Finder," you can measure the percent slope on any slope or in any field.

(Turn this sheet over and use as described above.)

SLOPE FINDER

Hang weight on a string from this point





Read percent of slope directly on this scale. At the point where string rests on scale, the number indicates percent of slope, or the number of feet of fall in 100 feet.

Three factors used in determining the land use capability class are (1) dominant texture of the soil profile; (2) slope of the land; and (3) amount of erosion. The texture of the different layers, especially the subsoil, and the percent of slope are often most important. However, erosion may become dominant where most of the original surface layer has eroded away leaving gullies or blow-outs.

Drainage is important in determining soil management practices and best land use. Drainage is not taken into consideration in determining capability class where drainage is feasible.

Soil Texture

The texture of the surface layer serves as a guide to land use and to maintenance problems.

Subsoil texture is the key texture of the soil profile. Texture and structure are important indications of air and water movement through the profile. Medium-textured subsoils, which are favorable to water movement, are in Class I. Fine-textured subsoils, which have slow and very slow permeability, are in Land Use Capability Class II or III. Coarse-textured subsoils with rapid to very rapid permeability and low moisture-holding capacity are in a lower class (IV or VI). For example, a moderately coarse-textured (sandy loam) subsoil would be placed in Class II or Class III. A very coarse-textured (sand) subsoil with very low moisture-holding capacity would be in Class IV, VI, or VII.

Slope

The percent, length and type of slope are important considerations in determining the safest intensive land use and soil conservation practices. The steeper the slope, the more erosion hazards.

The study of slope can be broken down into percent of slope, length of slope, and slope type (smooth or irregular).

Percent of slope is important in determining land use capability, especially when coupled with an estimate of the slope length and type. A nearly level 0 to 2% slope would be Class I unless other problems were present. Steep slopes of 18 to 25 percent will be Class VI, or Class VII depending on the soil and amount of erosion. Slopes over 25 percent are usually in Class VII.

Erosion

Fields where erosion is not a hazard are Class I if the soil and slopes are favorable. Severe erosion is an added hazard to management and use, and such areas are placed in Class III, IV, VI, VII or VIII.

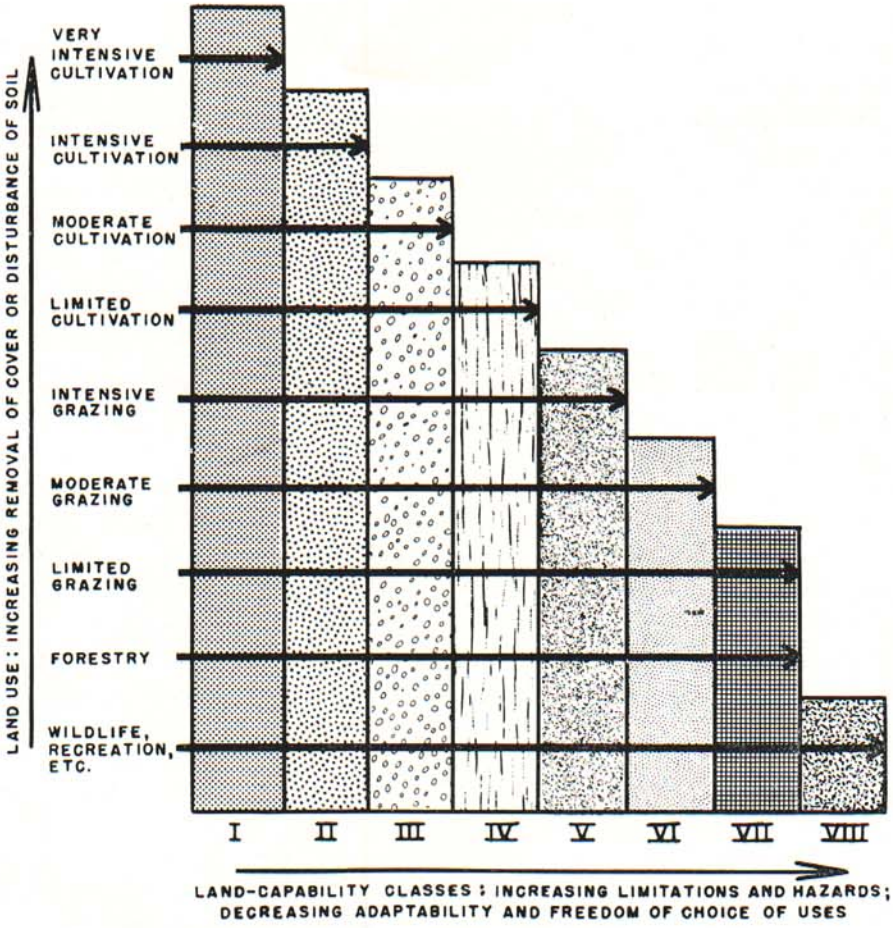


Fig. 6.—Types of land use possible with the different land use capability classes.

Land Capability Classes

Best suited for cropland

Class I—This is very good productive farm land that can be cultivated safely with ordinary good farming methods. It will grow all locally adapted crops. It is nearly level, easy to till and not droughty. It holds water well and has good natural fertility. It is practically free from hazards. Erosion is not a problem and the soil is easily drained. It can be maintained with ordinary good farming practices such as crop rotations, fertilizer, and lime when needed.

Fig. 7.—Class I land—good productive land with few hazards for intensive use.

Class II—This is good land that can be cultivated safely if simple measures are taken to overcome some particular handicap such as erosion or low organic matter. It may be steep enough so that run-off water carries soil. It may tend to be a little droughty. Some Class II land may be a little wet and require drainage. Usually the drainage is easily installed, but maintaining the drainage system may present some problems. Water may move slowly through the soil. Any of these conditions either limits the use of the land or requires special attention to such conservation practices as contouring, protective cover crops, application of organic matter, and simple water management.

Class III—This is moderately good land. Most crops grow well, but the soil needs a lot of protection and care. Its use is more limited than Class II because of one or more particular physical features.

Several kinds of land fit in Class III. Some is so steep that it requires intensive erosion control measures when used for row crops. *Poor drainage* may place it into Class III if the necessary drainage is hard to maintain. Droughty land may also be included since it is apt to suffer from wind erosion. These problems must be overcome or combatted year after year if the land is used for field crops.

Class IV—This land may grow an occasional row crop with very careful management. Row crops should not be grown more often than once in five or six years.

Class IV land is often too steep or irregular and badly eroded to cultivate. Or it may be too dry for dependable crop production.

Class IV land may be wet, making it very hard to install and maintain drainage. It should be used mainly for hay and small grain crops.

Best suited for permanent vegetation

Class V—This land is nearly level and not subject to erosion, but it isn't suited for cultivation because of permanent wetness or stoniness. Drainage of this class is not practical because of cost or no outlet. There is little limitation to its use for pasture or forestry.

Class VI—Land in this class is best adapted to growing grass or trees. Its use for grazing is somewhat limited by steep or very irregular slopes, shallow soils, stoniness, dry condition, or excessive wetness. There is little limitation for forestry and recreation.

Class VII—This land is best suited for forestry recreation, though some Class VII fields can be grazed with careful management. Limitations to grazing include steep slopes, droughtiness, and severe past erosion. It may be necessary to scalp spots rather than plow furrows before you plant trees.

Class VIII—This land is not suited for cultivation, pasture or woods. Leatherleaf bogs and rock outcrop areas are typical of this class in Michigan.

PART IV: LAND USE

Parts I, II, and III emphasized the physical soil features, major problems, and land-use capability classes.

The next step is to determine the most intensive safe use for general farming. That is important because land must be used intensively to give sufficient volume of business and high income under most Michigan conditions.

It also provides a common starting point to select suitable conservation practices in Part V.

Rotation

What kind of rotation is necessary on the area judged? Can we grow crops continuously without the benefit of hay and pasture? What supporting conservation practices are necessary?

In soil and water conservation, continuous row cropping is the most intensive use. Continuous grass or tree cover with nothing harvested, coupled with complete protection from fire and grazing, is the least intensive use.

For a general farming program, we can select the most intensive safe use from the choices below: (In Part V the necessary conservation practices to support the choice will be selected.)

1. Rotation that includes grasses and legumes less than ¼ of the time. (Less than one rotation hay crop in four years.)

2. Rotation that includes legumes and grasses ¼ of the time. (One rotation hay crop every four years.)

3. Rotation that includes legumes and grasses ½ of the time.

4. Rotation that includes legumes and grasses ¾ of the time. (May have an occasional row crop.)

5. Rotation that includes legumes and grasses ¾ of the time with no row crops.

6. Meadow or Pasture (Not rotation hay or rotation pasture.)

7. Woodland and/or recreation.

PART V: RECOMMENDED TREATMENT AND CONSERVATION PRACTICES

Part V of the land judging score card lists treatments and conservation practices that are required with the most intensive safe land use selected in Part IV.

A specific number of most needed practices will be required for Part V. Choose these practices from the list on the back of the card. Place the practice number in the boxes starting from the left side of the card.

To select these practices and treatments, look at the physical soil characteristics and the problems that affect the use and treatment of the area. For the most intensive safe cropping plan that you have selected, decide which practices or treatments are needed to maintain the soil on a sustained basis.

An explanation of the twenty-four practices and treatments listed on the back page of the score card follows:

1. Sod waterways are natural or constructed courses for the flow of water, in which a sod cover has been established and will be maintained.

2. Contour tillage is to plow, plant, cultivate, and harvest at right angles to the natural direction of the slope. The whole field is usually planted to one crop.

3. Minimum tillage is the least amount of field preparation and cultivation necessary to obtain quick germination, a good stand and high crop yield.

4. Strip cropping for erosion control includes planting strips of alternating hay or small grains with row crops. To control water erosion, all rows are at right angles to the direction of the main slope. To stop wind erosion, the rows are at right angles to the direction of the prevailing winds. In *contour strip cropping*, the strips are con-

structed so that they closely follow the contour level of the land and are at right angles to the direction of the slope.

5. Terraces or diversion. A terrace is an earth ridge or embankment usually constructed on a slight grade across a slope to control run-off water and minimize erosion. Usually several terraces on a slope make up what is called a "terrace system."

A diversion is a channel running across a slope (usually with more grade than a terrace) to divert water from a critical area to another location where it will do less harm. It may also be used to protect a long slope.

6. Install and/or maintain artificial drainage. This may involve (1) an open ditch to carry off surplus surface water, (2) an outlet for tile drainage, (3) tile drainage to drain off excess water from within the soil, (4) bedding to help remove surface water.

7. Apply available barnyard manure. Just what it implies—spread it immediately.

8. Liming materials for growing legumes. Apply liming materials if a soil test shows need. A soil test of pH 6.5 or lower shows such a need.

9. Commercial fertilizer materials for legumes. Clays, clay loams and silty clay loams. (Use a soil test for 9, 10, and 11. Refer to fertilizer recommendations found in M.S.U. Extension Bulletin E-159, revised "Fertilizer Recommendations for Michigan Crops.") If test is not available on these soils, phosphorous is generally needed more than potassium. Then a 0-2-1 fertilizer ratio would be recommended.

10. Commercial fertilizer materials for legumes, silt loams and sandy loams. On these soils, legumes usually need fertilizer containing equal amounts of phosphorous and potassium. An 0-1-1 ratio would generally be recommended if a test is not available.

11. Commercial fertilizer materials for legumes. Loamy sands and sands. On these soils legumes usually need fertilizers containing more potash than phosphorous. An 0-1-2 or an 0-1-3 ratio is recommended. Mucks are very low in potash, so they require an 0-1-3 ratio on most legume crops.

12. Cover and green manure crops. A cover crop is a close-growing crop grown primarily for soil protection between periods of regular crop production, or between vines and trees in vineyards or orchards. Examples are rye, buckwheat, rye grass and sweet clover.

A green manure crop is any crop to be plowed under or worked into the soil while green or soon after maturity for soil improvement. Usually, sweet clover, red clover or a mixture containing a legume are used.

13. Establish and/or maintain legume grass mixture for meadow or pasture, reseeding only when necessary. This practice applies to land that is planned for continued meadow or pasture. When necessary to re-establish, the land is worked up with a minimum of tillage and reseeded.

14. Establish and/or maintain grasses for permanent cover, reseeding only when necessary. This applies to land that is to be kept in grass. If reseeding becomes necessary, ground is worked with surface tillage tools and reseeded alone.

15. Managed grazing of pasture for erosion control. Protect the pasture from being over-grazed because erosion is common on steep, over-grazed pastures.

16. Topdress with phosphorous and potash. On meadows or pastures of legume-grass mixtures that are used over two years, an annual topdressing with phosphorous and potash is recommended.

17. Topdress permanent vegetation with commercial nitrogen. This applies to grass meadows or pastures that are kept in grass continuously.

18. Eradicate brush. On brushy lands used for meadow or pasture practically all of the time, brush needs to be eradicated to provide maximum pasture.

19. Return crop residues to the soil. Vegetative matter should be returned to the soil. It should not be destroyed by fire or removed from the field.

20. Windbreaks for erosion control. Plant shrubs or trees to protect fields from wind erosion.

21. Special plantings for wildlife food and cover. Plant shrubs or trees that will furnish food and cover for birds or small animals. These plantings may be on odd corners of field areas or as field or woodland borders.

22. Plant adapted species of trees. On sites to be forested, plant species that are adapted to the particular site.

23. Protect tree and shrub areas from grazing and burning. Present woodlots and new plantings of trees or shrubs should be protected from grazing and burning.

24. Manage woods. Harvest mature trees, remove cull trees, etc. Remove trees that are not growing any more, remove undesirable species, deformed trees or weeds.

LAND JUDGING CONTESTS

Land appreciation schools and land judging contests are valuable for young people; farmers; and business, professional and women's groups. Land appreciation training may be held indoors or out-of-doors and at any season of the year. Land judging must be done in the field when weather and field conditions are suitable.

Land appreciation training and land judging contests go well together. Appreciation training should come first, followed by judging.

In the National Land Judging Contest and in most Michigan contests, four fields are judged. In local contests and training exercises, use as many fields as you can while leaving enough time for discussion of the decisions.

Procedure for conducting a contest is about as follows:

(1) Pick a farm that is easy to get to.

(2) Obtain the owner's permission.

(3) Have plenty of parking space.

(4) Select the land area ahead of the contest to allow for digging profiles, obtaining soil samples and deciding on final placings. In large contests, it is desirable to have a small committee of agricultural leaders help plan and conduct the contest.

After you have selected the land areas to be judged, dig in each a large enough pit to show important parts of the soil profile. If at all

Fig. 8.—Receiving instructions before a land judging contest.

possible the land area selected should have uniform characteristics. Also, it should be large enough to be a practical management unit.

Put some surface soil and subsoil in individual boxes, label, and place a few feet from pit.

Put a sign at each location to be judged giving (1) number of the location or field, (2) the size of the area to be judged, (3) the pH of the soil, (4) tests for phosphorous and potash, (5) the number of problems to be selected in Part II of the Score Card, and (6) the number of practices to be used in Part V on the card.

When contestants have arrived, give them details such as location of the area and system of group rotation. Determine group size by the number of areas to be judged and provide each judge with a score card for the first land area. No group should have over 25 members.

Have a leader or guide for each group. He will guide the group to each location, distribute score cards as needed and collect the completed score cards at each location.

If you are planning a land judging contest, consult your County Extension Director and your Soil Conservation Service Technician for further details.

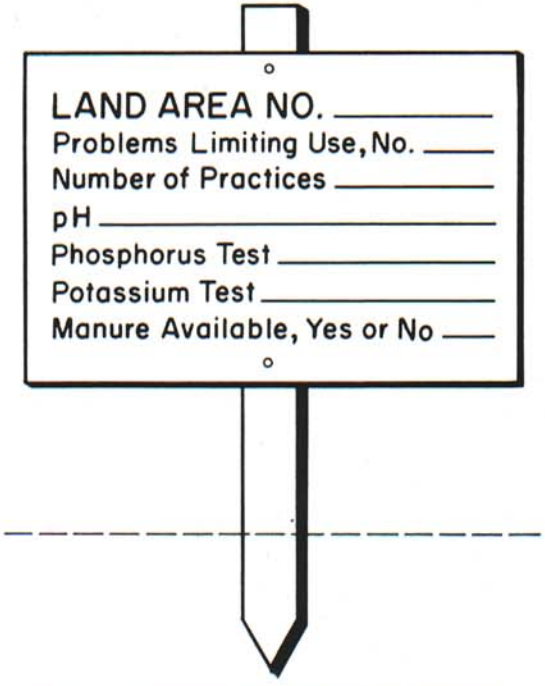


Fig. 9.—Suggested sign for each judging site.

PUBLICATIONS THAT WILL HELP YOU JUDGE AND USE LAND PROPERLY

Extension Bulletin E-159 (Latest Edition) Fertilizer Recommendations for Michigan Crops.

Recommendations are based upon soil groups and soil tests. The latest edition contains fertilizer recommendations and use based upon many years of experimental work and field experience.

Extension Folder F-279—Lime for Michigan Soils.

A series of questions and answers. Discusses the need for lime and amounts to use.

Extension Folder F-278—How to Take Accurate Soil Samples.

This folder tells how to take representative and uncontaminated soil samples including suggestions for transporting them to testing laboratory.

Extension Bulletin 264—Forest Trees and Shrubs: What, Where, How to Plant.

Forest plantings will produce a valuable crop, prevent loss of topsoil, provide a windbreak, improve a farm's appearance, and serve other useful purposes. This 24-page bulletin tells how to use forest trees and shrubs.

Extension Folder F-171—Pave your Waterways with Grass.

Many pictures help show steps in establishing grass waterways to carry off excess water without damage to farm land.

Extension Folder F-118—Wind Protection for Rural Michigan.

Discusses, with help of drawings, where to locate and how to plant windbreaks, shelter-belts and snowbreaks on Michigan farms.

Special Bulletin 402—Soils of Michigan.

Students of land judging will want this 52-page bulletin which reveals the history of various kinds of soil, and includes a colored soil map.

Extension Bulletin 352—Minimum Tillage.

Describes minimum tillage operations, its values and its relationship to soil structure and crop yields.

Extension Bulletin 307—Conservation of Michigan's Muck Soil.

Tells about the relationship of land-use practices to wildlife production, age, erosion, excessive decomposition and nutrients in the soil.

Extension Folder F-280—Wildlife-An Extra Gift from the Land.

Tells about the relationship of land-use practices to wildlife production, with many suggestions for improving wildlife food and cover.

Soil Conservation Districts in Michigan—State Soil Conservation Committee.

This bulletin explains the organization and operation of soil conservation districts. The need for soil and water conservation and for community action to solve these problems is explained.

If you live in Michigan you can get a free copy of the above publications from your County Cooperative Extension Service Office.

USDA Farmers Bulletin No. 2035—Making Land Produce Useful Wildlife.

USDA Leaflet No. 249—What is a Conservation Farm Plan.

Tells the steps in obtaining a land capability map and farm plan with the help of Soil Conservation Service employees.

USDA-SCS PA 128—The Measure of Our Land.

Points out the need for concern about good land use; describes the eight land use capability classes and how to use each type properly.

The above 3 USDA publications are available from the SCS Work Unit Conservationist in counties having a Soil Conservation District.