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EXTENSION SERVICE

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Land Judging in West Virginia

A program of
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The 2017 Land Judging Manual was developed from Land Judging materials and booklets prepared by George Sharpe (retired WVU Extension Specialist) and Richard Zimmerman (retired WVU Extension Specialist). The success and popularity of the Land Judging program in West Virginia can be attributed to the leadership of Mr. Sharpe and Dr. Zimmerman, and the continuing efforts of many dedicated FFA teachers and WVU extension agents throughout the state.

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Why Land Judging Is Important

Land Judging is a program that teaches basic principles of soil science and helps us understand practices that can protect and conserve land, water, and the environment. In Land Judging, participants learn to look for things that make one soil different from another; why some soils are dry and others wet; how "mottling" is a clue to drainage; how soil texture is determined by rubbing soil between your fingers; and how to judge depth, erosion, slope, and permeability.

Students judge factors of the land and soil properties in land judging.

These factors are used to classify land. Land capability classes tell us how intensively we can use the land without damaging it, how to protect it from erosion and loss of plant nutrients, and how to improve crop production. Finally, in Land Judging, participants learn some of the conservation practices needed to maintain or improve lands and how and when to use strip cropping, pasture management, diversion ditches, and other practices designed to protect the land. Land Judging helps participants to understand a site's soils and land capability.

Soil pits are dug and students judge soil properties by looking at the soil profile.

Land Judging in West Virginia focuses on the conservation of agricultural land. Many of the factors used in Land Judging are also applicable to evaluating sites where homes will be constructed. Homesite Evaluation is a natural extension of the Land Judging program and provides another dimension to soil and water conservation education in West Virginia.

Youth Land Judging Rules and Procedures

Method

In Land Judging, a team is made up of three or four members. The total of the top three scores made by the individual members of the team is the team score. All team members are eligible for individual and team prizes. Team members judge four fields previously selected and scored by the judges. Each field is marked off with wire flagging or other boundary markers. Within the field, a pit or hole is dug, which exposes the soil

profile. From this profile, contestants determine the texture, depth, degree of erosion, permeability, and internal drainage of the soil. After these soil properties are determined, land use interpretations are made. In each field, two wooden stakes are set up in which the contestants measure slope.

Expectations

The judges give any information that is needed about each field on a sign. This may include the original topsoil depth, mottles, soil pH, amount of available plant nutrients, and size of the field. Unless otherwise announced, contestants are given 30 minutes to judge the factors in each field and record them on scorecards. At the end of the allotted time, a group leader calls for the scorecards. There should be no talking at any time, except to the group leaders if a contestant has a question or needs clarification. In all contests, one or more judges score all fields. Their decisions are final.

During contests, contestants write their answers on scorecards.

Rules

The following rules apply at Land Judging and Homesite Evaluation Contests.

1. Contestants are allowed to have the following pieces of equipment:
   a. pencil(s) with an eraser
   b. a clean clipboard with no markings (clear clipboards are preferred)
   c. knife or screwdriver
   d. towel or rag
   e. scorecards or score sheet

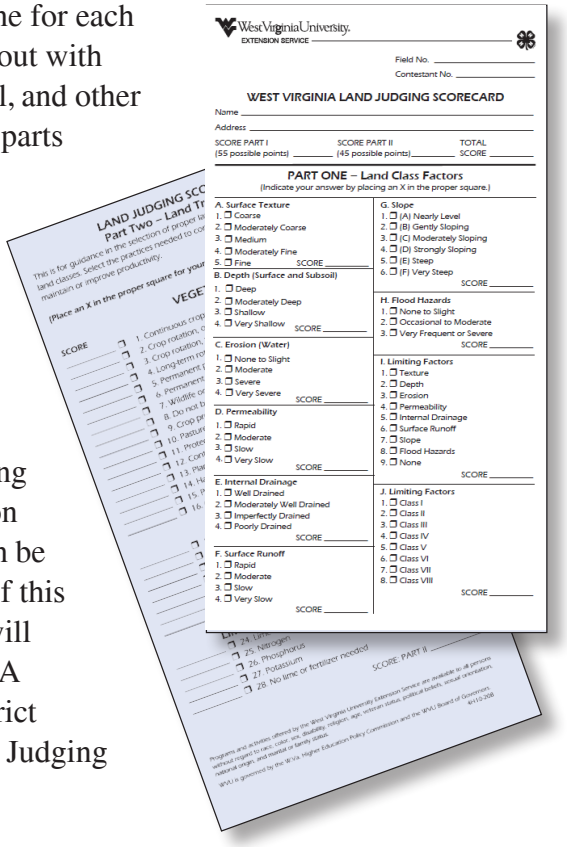
After contests, the judges teach students how the soil was judged and questions about the soil are answered.

2. Coaches are encouraged to focus on training the students in Land Judging principles and ethical competition.
3. Once the contest begins and contestants are at the field sites, no talking or comparing answers by participants is allowed. Any contestant whispering or comparing answers with another contestant will have his/her scorecard taken. No cell phones.

4. Group leaders should be briefed in a short meeting before the contest on possible unethical practices by contestants. Group leaders have the authority to disqualify contestants for any form of cheating, misuse of equipment, or other unethical practice.

How to Complete a Land Judging Scorecard

Each team member receives four scorecards, one for each field. The top of the scorecard should be filled out with the contestant's name, number, county or school, and other information used by the judges. Answers to all parts must be properly and clearly marked with an × so there is no doubt as to which square was marked. The scorecard is divided into two parts. Part I deals with the land and soil conditions. Part II determines how the land will be used and which conservation practices are needed for its protection and wise use.


WEST VIRGINIA LAND JUDGING SCORECARD

PART ONE – Land Class Factors

(Indicate your answer by placing an X in the proper square.)

A. Surface Texture
1. ☐ Coarse
2. ☐ Moderately Coarse
3. ☐ Medium
4. ☐ Moderately Fine
5. ☐ Fine
SCORE

B. Depth (Surface and Subsoil)
1. ☐ Deep
2. ☐ Moderately Deep
3. ☐ Shallow
4. ☐ Very Shallow
SCORE

C. Erosion (Water)
1. ☐ None to Slight
2. ☐ Moderate
3. ☐ Severe
4. ☐ Very Severe
SCORE

D. Permeability
1. ☐ Rapid
2. ☐ Moderate
3. ☐ Slow
4. ☐ Very Slow
SCORE

E. Internal Drainage
1. ☐ Well Drained
2. ☐ Moderately Well Drained
3. ☐ Imperfectly Drained
4. ☐ Poorly Drained
SCORE

F. Surface Runoff
1. ☐ Rapid
2. ☐ Moderate
3. ☐ Slow
4. ☐ Very Slow
SCORE

G. Slope
1. ☐ (A) Nearly Level
2. ☐ (B) Gently Sloping
3. ☐ (C) Moderately Sloping
4. ☐ (D) Strongly Sloping
5. ☐ (E) Steep
6. ☐ (F) Very Steep
SCORE

H. Flood Hazards
1. ☐ None to Slight
2. ☐ Occasional to Moderate
3. ☐ Very Frequent or Severe
SCORE

I. Limiting Factors
1. ☐ Texture
2. ☐ Depth
3. ☐ Erosion
4. ☐ Permeability
5. ☐ Internal Drainage
6. ☐ Surface Runoff
7. ☐ Slope
8. ☐ Flood Hazards
9. ☐ None
SCORE

J. Limiting Factors
1. ☐ Class I
2. ☐ Class II
3. ☐ Class III
4. ☐ Class IV
5. ☐ Class V
6. ☐ Class VI
7. ☐ Class VII
8. ☐ Class VIII
SCORE

See actual scorecard example in Appendix, pages ii and iii.

Alternatively, instead of individual Land Judging scorecards, a one-page score sheet with a carbon back, in which answers to all four field sites can be tabulated, may be used. A clipboard is needed if this score sheet is used. The one-page score sheet will generally be used at the State 4-H and State FFA Contests. At FFA regional or conservation district contests, either the one-page sheet or blue Land Judging cards may be used.

Part I

In filling out the scorecard or sheet, eight land and soil factors are determined which may limit the use of the land: (A) surface texture, (B) depth of soil (which includes both topsoil and subsoil), (C) amount of erosion, (D) permeability, (E) internal drainage, (F) surface runoff, (G) slope, and (H) flood hazards. These eight factors are described in this guide, starting on page 6.

A soil of a particular field may have 0, 1, 2 or more limiting factors. See definitions on page 11. *The severity of the (I) limiting factors and not the number of them determines the best use of the land.* In Land Judging, we always assume that the land will be used as intensively as the (J) capability class will permit. For example, Class VI land should not be used for crops. The most intensive use of Class VI land is pasture, even though the land may be in timber or brush. Descriptions of land classes can be found under Land Capability Classes on page 12.

Part II

This part of the Land Judging Contest determines land use and practices. It is divided into three sections: (1) Vegetative, (2) Mechanical, and (3) Fertilizer and Soil Amendments. Explanations for these are found under Land Treatment on page 17. Practices from all of these groups may be needed to properly treat the field. The first thing to do in Part II is to decide how the field should be used. For example, suppose in Part I that the land is Class VI. From the Land Capability Class definitions, the most intensive use for Class VI land is pasture. Class VI land also could be used for woodland, but that is a less intensive use. Regardless of the field's current use, the most intensive use for the class of land selected in Part I must be chosen. After this, contestants should put an × in the block by No. 5 Permanent Pasture, and then select other practices that go with good pasture use, such as No. 10 Pasture Management. Contestants must check all of the practices needed for the land class selected in Part I. Other vegetative and mechanical practices and soil amendments may be necessary, depending on the information given on the field sign and the condition of the field.

Field Signs

Information necessary to complete the Land Judging and Homesite Evaluation scorecards is found on a field sign, which will be located near the soil pit of each field. Conditions and information generally given on the field sign are as follows:

1. Field Number: _____
2. Thickness of Original Topsoil: _____ inches.
3. Depth of Mottles: _____ inches.
4. Field Size: _____ acres.
5. Soil pH: _____
6. Phosphorus: _____ pounds per acre.
7. Potassium: _____ pounds per acre.
8. Nitrogen: _____ (sufficient or deficient).
9. Other Factors: (flooding frequency, overhead water problem, etc.).

Field signs give important information necessary for filling out the land judging scorecard. See example in Appendix, page i.

Scoring Land Judging Contests

When both Part I and Part II are completed by the contestants, the scorecards and sheets are collected and graded by the scorers. Points are awarded for each factor and practice. Each field (or soil pit) has a possible 100-point value. The cards are scored as follows: 55 points for Part I (10 points for Land Capability Class, 5 points for each of the other nine factors). All limiting factors must be marked for a score of 5 points.

If there are no limiting factors, number 9 under limiting factors must be marked to receive credit.

Forty-five (45) points will be scored for Part II as follows: 15 points for the Vegetative part, 15 points for Mechanical, and 15 points for Fertilizer and Soil Amendments. Scoring in Part II is as follows: If the correct number of ×s under Vegetative should be 3 and a contestant has 5 ×s, a line will be drawn under the third ×. No score will be given for any correct × under that line. The same procedure will be followed for Mechanical and Fertilizer and Soil Amendments. In the event that no treatment is necessary, the contestant should mark number 23 under the Mechanical Practices and number 28 under Lime and Fertilizer Application. These squares must be marked to receive credit when no treatments are required.

In case of individual ties, Field No. 1 is used as a tie breaker. If necessary, the same method is continued with Fields 2, 3, and 4. In the case of team ties, the total score of the top three land judgers on a team for Field No. 1 is compared to the other team's and used as a tie breaker. If necessary, the same method is continued with Fields 2, 3, and 4.

About Eligibility and Qualifications

Winning teams often receive plaques or ribbons at land judging contests.

Teams from 4-H groups attend the State 4-H Contest and compete against other 4-H teams. Each FFA region in the state holds a contest to qualify teams to participate in the State FFA Contest.

If the same FFA team wins both the Land Judging and Homesite Evaluation Contests at the regional level, that team will represent the region at the State FFA Contest. A second team from the region will be selected by totaling the team scores for both Land Judging and Homesite Evaluation Contests, and the team with the next highest point total will be eligible to participate in the State FFA Contest. This same process will govern the determination of teams to attend the National Contest in both 4-H and FFA State Contests.

The winning teams from the State FFA and State 4-H Contests (in both Land Judging and Homesite Evaluation) are eligible to participate in the National Land Judging Contest in Oklahoma the following spring. Anyone who has competed in the National Land Judging or Homesite Evaluation Contest is not eligible to compete in any later FFA region, conservation district, or state Land Judging Contest.

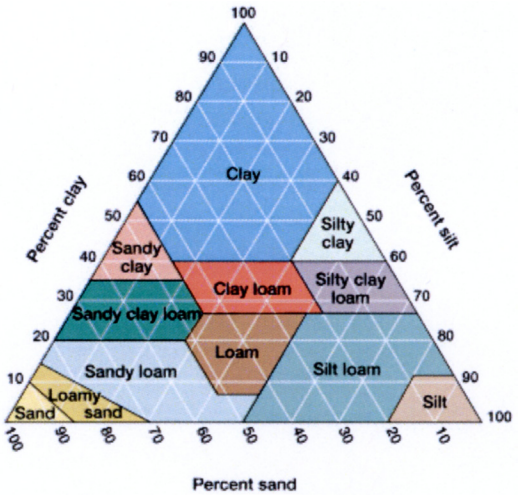
Definition of Soil Characteristics

What makes one piece of land different from another is defined by soil properties or degree of erosion and slope.

Surface Texture

Soil texture refers to the relative proportion of sand, silt, and clay particles. Texture is most easily determined in the field by pressing and rubbing moist soil between the fingers. The texture of the subsoil also should be examined because it is often different from that of the topsoil and aids in determining erosion, permeability, and internal drainage.

Textural Triangle Chart



There are 12 soil texture classes on the chart. You can find the soil texture if you know the percentage of sand, silt, and clay in your sample. For example, a soil with 40% sand, 20% clay, and 40% silt would have a soil texture class of loam. The chart will give you the range of particle sizes if you know the type of soil texture.

Coarse: Soil is loose and individual grains can be seen and felt. When squeezed between thumb and fingers, it feels gritty and will not ribbon or stain fingers. When dry, squeezing will cause it to fall apart. When moist, a mold may be formed which is unstable and crumbles as the soil is handled. Coarse-textured soils include sand and loamy sand. *Coarse-textured soil is a limiting factor in land use.*

Moderately Coarse: Soil feels gritty but contains enough silt and clay to make moist soil hold together. Individual sand grains can be felt and seen. Squeezed when dry or moist, it will form a mold which breaks apart when handled. When moist, it forms a very weak ribbon or none at all. Moderately coarse soils are sandy loam and fine sandy loam. It is *not* a limiting factor in land use.

Medium: Soil feels smooth and floury. It will form a mold that can bear some handling. When moist, it will form a ribbon that is ½ inch to less than 1 inch in length. The ribbon breaks up readily and will scarcely take a polish. This texture is more desirable than either fine or coarse-textured soils. Medium-textured soils include silt, silt loam, and loam. Medium-textured soil is *not* a limiting factor in land use.

Moderately Fine: Soil is hard and breaks into clods when dry. When moist, soil can be squeezed between thumb and forefinger to form a ribbon from 1 to 2 inches in length with a shiny surface which will bend downward. Moderately fine soils are sandy clay loam, clay loam, and silty clay loam. It is *not* a limiting factor in land use.

Fine: Soil is very hard and forms massive lumps or dense clods when dry, and are plastic and sticky when wet. When squeezed between thumb and forefinger when wet, it forms a ribbon 2 inches or longer with a shiny surface. It will "polish" when rubbed with the flat side of a knife. When pressed together several times, it becomes hard and difficult to press the thumb through it. Fine-textured soils include clay, silty clay, and sandy clay. Fine-textured soil is a limiting factor in land use.

Depth of Soil

The depth of soil is determined by the total thickness of soil layers significant to soil use and management. The soil layers or horizons are generally underlain by "parent material" from which the soil developed. Soil depth is defined as depth to bedrock. Plant roots are normally expected to penetrate the soil layers above the parent material. Restrictive layers, often referred to as pans (such as fragipans or claypans), are layers that restrict root penetration and air and water movement. These layers, however, should not be considered to limit soil depth. If a restrictive layer is encountered in a contest, the judges will provide clues on the field sign. In West Virginia Land Judging, four soil depth classes are recognized.

Deep: ≥36 inches deep. This is *not* a limiting factor.

Moderately Deep: 20 to <36 inches deep. *This is a limiting factor.*

Shallow: 10 to <20 inches deep. *This is a limiting factor.*

Very Shallow: <10 inches deep. *This is a limiting factor.*

Erosion

Erosion – the detachment and movement of soil from one place to another – is caused by water and/or wind. Only water erosion is common in West Virginia. The thickness of the original topsoil is given on the field sign so calculation of erosion is possible by determining the thickness of the present topsoil. For example, if 6 inches of topsoil are found in the pit and the original topsoil thickness on the sign is 10 inches, then 6/10 equals 0.6 or 60% and 100-60 is 40%. Therefore, 40% of the topsoil has been lost, resulting in an erosion class of Moderate. The following are definitions of erosion classes:

None to Slight: <25% of the original surface soil (topsoil) has been removed and no gullies are present. This is *not* a limiting factor.

Moderate: 25% to <75% of the original surface soil has been removed and no gullies are present. *This is a limiting factor.*

Severe: 75% to 100% of the surface soil has been removed. Considerable subsoil may be mixed in the plow layer. Occasional gullies may be present. *This is a limiting factor.*

Very Severe: All the original surface soil and part of the original subsoil have been removed. The land may have gullies (> 8 inches across and > 6 inches deep) that are actively eroding. *This is a limiting factor.*

Permeability

Permeability refers to the rate at which water and air move through the most restrictive layer in the subsoil. The permeability of a soil is estimated by determining the texture, density, and structure of the most dense and tightest layer in the soil profile (from 0 to 36 inches in depth). Coloration of the subsoil may help in determining permeability but should be used with other indicators. If restrictive layers are encountered, permeability will be either slow or very slow, depending on the properties of the layer. Four classes of soil permeability are recognized in West Virginia.

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Rapid: These soils have coarse or gravelly subsoils with little if any defined structure. Textures are loamy sand and sand. There is very little restriction of air and water movement. *This is not desirable and is a limiting factor.*

Moderate: These soils usually have medium-textured subsoils, such as loam, silt, silt loam, and sandy loam with good structure. They break apart easily. Clay skins may be present. Water and air movement is good. Plant roots are abundant and penetrate easily through the soil. This is a desirable condition and *not* a limiting factor.

Slow: These soils have fairly tight subsoils with moderate to good structure. Textures may include sandy clay loam, clay loam, and silty clay loam. Clay skins may be present. These subsoils are firm when moist and hard when dry. Roots are common and may be found along ped faces. Fragipans, if encountered and noted on the field sign, are dense layers and are classified as slow. In wet periods, the soil may become waterlogged. *This is a limiting factor.*

Very Slow: These soils have dense, heavy clay subsoil with little or no obvious structure, and very few visible pores. Textures may include clay, silty clay, and sandy clay. Clay skins may be present. After being firmly squeezed five to seven times, these subsoils become hard so that pushing your thumb through them is difficult. Roots are few, if they occur at all, and are restricted to ped faces and small pores. Water may stand on the surface of level land or run off and cause erosion on sloping land. *This is a limiting factor.*

Internal Drainage

Natural soil drainage refers to the average wetness or dryness of a soil and may be a clue to soil permeability. Soil texture, structure, slope, and shape of the land and presence of a high water table all affect soil drainage. The color of the topsoil and subsoil are clues to internal drainage. Well-drained and moderately well-drained soils have a bright uniform color. They may be brown or various shades of red, brown, or yellow. A pale or washed-out gray color is an indication of restricted drainage. A thick, black topsoil may also indicate that the land is wet for long periods.

Contestants use a clipboard to judge slope.

Mottling of the soil (mixed yellow, orange, red, and gray colors) is a sign of restricted drainage. Rust spots are caused by oxides of iron. Do not misinterpret rust mottling for weathering particles of parent material. The particles of parent material (often sandstone or shale) can be felt as gritty particles between the fingers, but mottles cannot be felt. Color and mottling are easy to see when the soil is moist, but they tend to fade when dry. The depth at which the mottling occurs indicates the zone of problem drainage. The closer to the surface the mottling occurs, the poorer the soil drainage. Mottling must also be consistent across the pit face. Internal drainage is given on the field sign by indicating the depth at which mottles are found. Assume no mottling if nothing is written on the field sign about mottling.

Well-Drained: Bright uniform color throughout the soil profile (mottling occurs >36 inches in depth). This is *not* a limiting factor in land use.

Moderately Well-Drained: Surface soil is a bright uniform color. Mottling occurs at 16 to 36 inches in depth. *This is a limiting factor in land use.*

Imperfectly Drained: Surface horizon (topsoil) is free of mottling. Mottling occurs at 8 to <16 inches in depth. *This is a limiting factor in land use.*

Poorly Drained: Mottling occurs at <8 inches in depth. *This is a limiting factor in land use.*

Surface Runoff

Four classes are recognized in surface runoff, based on the flow of water across the soil surface as determined by slope and characteristics of the soil profile (texture, permeability, and internal drainage).

Rapid: Large amounts of water move rapidly over the surface of the soil. Generally, only a small part moves into the soil profile. For Land Judging, land with slopes of ≥8% (moderately sloping or greater) will be classified as having rapid runoff. This condition increases erosion hazards and *is a limiting factor in land use.*

Moderate: Applies to surface water when it flows slowly enough that a moderate portion of the water enters the soil. Water puddles on the surface for only short periods. Slope is 1% to <8%. It causes little or no erosion hazard and is *not* a limiting factor in land use.

Slow: Applies to water flowing away so slowly that water covers the soil for short periods. While this condition causes little or no erosion hazards, it can interfere with soil cultivation. Slow runoff occurs on nearly level land (0% to <1% slope) and is *not* a limiting factor in land use.

Very Slow: Applies to surface water more or less standing on the surface for long periods in depressions on the landscape. The depressions should be found between the slope stakes. Water on the surface has no outlet. Most of the water either passes through the soil or evaporates. On coarse-textured soils, water may enter the soil immediately and cause leaching. Very slow runoff occurs on level land (0% slope). *This condition is undesirable and is a limiting factor in land use.*

Slope

Slope is the number of feet of rise or fall in each 100 feet of land and is expressed in percent. In Land Judging contests, the area to be measured for slope is marked by two wooden surveyor's stakes driven in to the same height. *In West Virginia, the slope stakes are always placed 50 feet apart.* No mechanical or digital levels may be used in Land Judging contests. To determine slope without instruments, place yourself 15 to 20 feet to the downhill side of the slope line made by the slope stakes. Use a straight edge (clipboard or scorecard) or your fingertips.

No mechanical or digital levels may be used in Land Judging contests.

If you use a straight edge, hold the edge with the fingertips of both hands, clamping your elbows to your body, and sight the edge on the bottom of the higher stake. Turn your body from the waist, holding your arms and straight edge in a rigid position, until you can sight across the lower adjacent stake. At this point, you estimate the height from ground level to the highest point you estimated on the lower stake, and from there arrive at the percent slope.

If you use your arm, place yourself in the same position (15 to 20 feet downhill of slope line) and extend one of your arms until you can sight over your fingertips to ground level at the higher stake. Then, holding your arm rigid, turn your body from the waist until

your line of sight is directly on the lower stake. Again, estimate the distance from ground level to the point you estimated on the lower stake. Judging slope correctly requires a great deal of practice.

Judging slope correctly requires a great deal of practice.

Slope classes are:

Nearly level: <3 feet rise or fall in each 100 feet or 0% to <3% slope. This is *not* a limiting factor.

Gently Sloping: 3 to <8 feet in each 100 feet or 3% to <8%. *This is a limiting factor.*

Moderately Sloping: 8 to <15 feet in each 100 feet or 8% to <15%. *This is a limiting factor.*

Strongly sloping: 15 to <25 feet in each 100 feet or 15% to <25%. *This is a limiting factor.*

Steep: 25 to <35 feet in each 100 feet or 25% to <35%. *This is a limiting factor.*

Very Steep: ≥35 feet in each 100 feet or 35% or greater. *This is a serious limiting factor.*

Flood Hazard

Flood hazard is a term related to land along streams that is subject to periodic overflows (floodplain or bottomland). For agricultural land use purposes, flooding hazards are grouped into three classes. Flood hazards are given on the field sign.

None to Slight: Floods <1 year out of 4 years. This is not a serious limitation to agricultural use and is *not* a limiting factor.

Occasional to Moderate: Floods 1 or 2 years in 4. While this is not too serious, it is considered a hazard and *is a limiting factor.*

Very Frequent or Severe: This land floods often; >2 years in 4. *It is a severe hazard and is a limiting factor.*

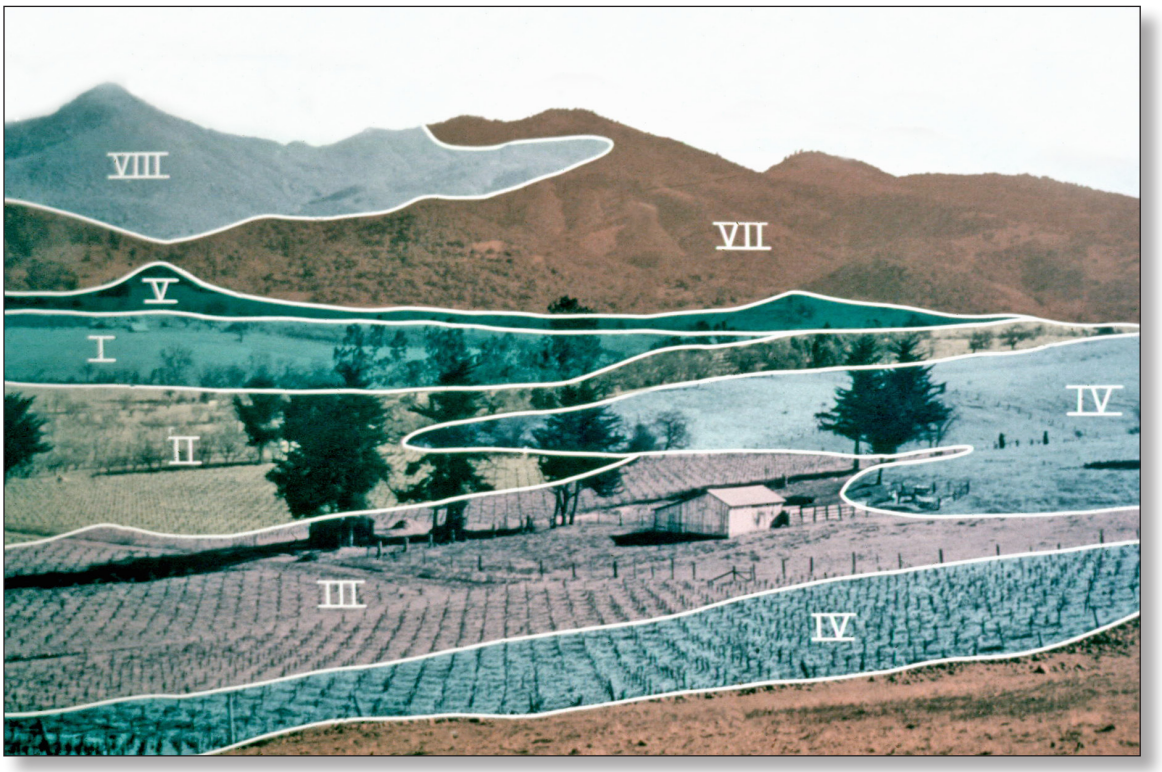
Limiting Factors

A limiting factor is any unfavorable soil property or characteristic that limits the land from intensive uses such as cropland (keeps it out of Class I land). Factors include limiting conditions of slope, erosion, texture, depth of soil, drainage, surface runoff, and flooding. An example of Class I land in West Virginia is land that is mapped as "Wheeling silt loam." It is a deep, well-drained, moderately permeable soil with a 0 to 3% slope, moderate runoff, slight erosion, and no flood hazard. However, the same soil with a 3 to <8% slope is placed in Class II because the slope imposes some land use limitations or hazards, and in this case is a limiting factor in land use. *Mark all characteristics that limit a site from being placed in Class I land.*

Definition of Land Capability Classes

Determining land-use capabilities or land class.

These varying types of land are classified in eight Land Capability Classes, which relate to the most intensive use of the land without damaging it. The classification is used in agricultural land use planning by the Natural Resources Conservation Service and similar agencies around the world. *(Note that Class I represents the best land and Class VIII the least favorable for farming.)*



Land capability classes I through VIII are depicted on this landscape. Land judging helps to determine the land capability class of soils and sites based on their degree of limiting factors.

Land Suited for Cropland and Other Uses

Class I Land

Soils in Class I have no limitations that restrict their use. They will grow practically any crop adapted to the locality. Class I land is nearly level, holds adequate supplies of plant-available water, is fertile, and is easy to work. Practically free from hazards, it is subject to little erosion and is well-drained. It can be maintained with good farming practices, such as the use of crop rotation, manure, fertilizer, and lime when needed.

Class II Land

Soils in Class II have limitations that require careful soil management and moderate conservation practices. Soils in this class are good, but certain physical characteristics keep them from being as good as Class I. Class II land may slope enough that runoff water may cause some erosion. It may tend to be a little droughty or a little wet. Any of these conditions may limit the use of the land or require some easily applied conservation practice such as contouring, strip cropping, or protective cover crops.

Class III Land

Soils in Class III have moderate to severe limitations and require special conservation practices. Soils in this class have more restrictions than those in Class II. When Class III land is used for cultivated crops, the conservation practices are usually more difficult to apply and maintain. Most crops will grow well, but the soil needs much protection and care. There are several variations in Class III land. Some of it is moderately sloping and needs intensive care to control erosion, especially when used for row crops. Poor drainage may place it in Class III if the necessary drainage practices are not installed and maintained. Droughty land also may be in Class III. These features must be overcome or combated year after year if used for crops.

These two photos demonstrate strip cropping and contour farming, management practices to reduce erosion on sloping land.

Class IV Land

Soils in Class IV have severe limitations that require management. The restrictions in the use of these soils are greater than those in Class III, and the choice of plants is more limited. Class IV land, which is not suited for regular cultivation, should not grow a row crop more than once in five years. Often, it is too steep and badly eroded for cultivation. It may be too dry for regular crop production, or it may be wet and drainage systems are too hard to install and maintain.

Land Limited in Use – Generally Unsuited for Cultivation

Class V Land

Soils in Class V have little or no erosion hazard, but other faults limit their use largely to pasture, woodland, or wildlife food and cover. Soils in this class are frequently flooded, may be poorly drained, or have some combination of these limitations. Because of these limitations, cultivation of common crops is not feasible, but pastures may be improved with lime and fertilizer and proper management.

Class VI Land

Soils in Class VI have extreme limitations that make them generally unsuited for cultivation and limit their use to pasture. It is practical, however, to apply pasture improvements, such as seeding, liming, fertilizing, and water control. Soils in Class VI have limitations that cannot be corrected, including steep slope, severe erosion hazard, effects of past erosion, stoniness or rock outcrops, shallow rooting zone, excessive wetness or overflow, and low moisture-holding capacity. Because of one or more limitations, these soils are not suited for cultivated crops, even though some of the soils in this class can be adapted to special crops such as grassed orchards.

These two photos demonstrate Class VI to VIII lands where steep slopes and rocky soils make the site suitable for forest and permanent woodlands.

Class VII Land

Soils in Class VII have severe limitations that make them unsuitable for cultivation and that restrict their use to permanent woodland. Physical conditions of soils are such that it is even impractical to apply pasture improvements. Soil restrictions are more severe than those in Class VI because of one or more limitations that cannot be corrected, such as steep slopes, erosion, shallow soils, stones or rock outcrops, or wet soil. Lime and fertilizer applications are not practical on Class VII lands and should be so marked on the card (No. 28) even though the field sign may give recommendations.

Class VIII Land

Soils and land forms in Class VIII have limitations that prevent their use for commercial plant production and restrict their use to recreation, wildlife, or watershed development. Soils and land forms in this class will not produce crops, grasses, or trees of much economic importance. Benefits from wildlife use, watershed protection, or recreation may be possible. Examples of Class VIII land are stream banks and rocky areas that will not grow trees. If Class VIII land is used in a contest, it must be given on the field sign. Lime and fertilizer applications are not practical on Class VIII lands.

Strip cropping and pasture are important land uses in West Virginia because of the hilly landscapes.

How to Determine the Land Capability Class

In most cases, the land capability class is determined by the most severe limitation. For example, suppose the site has the following factors: medium texture, deep soil, no to slight erosion, slow permeability, well-drained, rapid runoff, steep slope, and no flood hazard. What would be its land capability class? First, it has three limiting factors – slow permeability, rapid runoff, and steep slope. According to the following table, the best class would be II for slow permeability, Class III for rapid runoff, and Class VI for steep slope. Now, because land capability class is determined by the most severe limitation (in this case, steep slope), the land capability class is Class VI.

Sometimes there are exceptions to the example given, and a combination of limiting factors will drop the land capability class one class more than any one factor alone. Two exceptions are:

1. Severe erosion drops the class one level more. Severe erosion by itself on Class I or II land will be Class III, severely eroded Class III land will drop to Class IV, severely eroded Class IV land drops to Class VI land, and severely eroded Class VI land drops to Class VII land. Class V and VII land are not dropped one class more for severe erosion.
2. Very slow permeability combined with Class III poorly drained soils lowers the land class to IV.

Soil Factors		*Best Land Capability Class Possible*
TEXTURE:	Coarse	III
	MCoarse,Medium,MFine	I
	Fine	II
DEPTH:	Deep	I
	Moderately Deep	II
	Shallow	III
	Very Shallow	VI
EROSION:	None to Slight	I
	Moderate	II
	Severe	III
	Very Severe	VII
PERMEABILITY:	Rapid	III
	Moderate	I
	Slow	II
	Very Slow	III
INT DRAINAGE:	Well-Drained	I
	Moderately Well-Drained	II
	Imperfectly Drained	III
	Poorly Drained	III
SURFACE RUNOFF:	Rapid	III
	Moderate	I
	Slow	I
	Very Slow	III
SLOPE:	Nearly Level	I
	Gently Sloping	II
	Moderately Sloping	III
	Strongly Sloping	IV
	Steep	VI
	Very Steep	VII
FLOOD HAZARD:	None to Slight	I
	Occasional or Moderate	II
	Very Frequent or Severe	V

Land Treatment

There are 28 practices listed under three headings: Vegetative, Mechanical, and Lime and Fertilizer Applications. Use practices from any or all of these three groups. Each practice is used under certain conditions and with certain Land Capability Classes. Understand that this is only a guide to help select the proper practices. Each contestant should learn to use good judgment and common sense with these practices. Select with care and remember to choose practices that will enable us to make the most intensive use of the field based on its capability class.

Vegetative Practices

Soil-conserving and soil-improvement crops prevent or retard erosion. They maintain rather than deplete soil organic matter, improve soil structure, and increase water intake and productivity of the soil. Grasses and legumes are two such crops. Recommended vegetative practices are:

1. **Continuous cropping –** use only on Class I land.
2. **Crop rotation:** one year of hay every third year – use on Class II land.
3. **Crop rotation:** two years of hay in every four years – use on Class III land.
4. **Long-term rotation** with three or more years of hay between crops – use on Class IV land.
5. **Permanent pasture –** Class V and VI land.
6. **Permanent woodland –** Class VII.
7. **Wildlife or recreation area –** Class VIII.
8. **Do not burn crop residues –** Class I through IV.
9. **Crop production management** may include residue management, cover crops, grassed water ways – Classes I through IV.
10. **Pasture management** may include reseeding, fertilizer and lime applications, clipping or mowing, pasture renovation – Class V and VI land.
11. **Protect from burning:** grass, brush or timber – Class V, VI, VII and VIII.
12. **Controlled grazing** may include deferred grazing, rotational grazing, and proper stocking – Class V and VI land.
13. **Plant recommended trees,** including windbreaks or woodland planting – Class VII and VIII. When used on Class VII, check number 14.
14. **Harvest trees selectively –** Class VII only.
15. **Protect from grazing –** Classes VII and VIII.
16. **Conservation planting:** shrubs and vines for erosion control, wildlife cover – Classes VII and VIII.

Mechanical Practices

These practices are needed to correct problems with the land so that it may be used according to its most intensive use. Controlling undesirable plant species is often necessary to improve growth of desirable plants. Certain mechanical and conservation practices reduce the potential for erosion, and others correct erosion or drainage problems.

17. **Control brush and trees** by using herbicides or cutting to remove undesirable brush or trees. Should not be marked if brush can be removed by normal plowing or clipping with a cutter bar (stem diameter 1 inch or less at 3 inches above ground level) – Class I through VI.
18. **Farm on contour:** plowing the whole field on the contour or at right angles to the slope. Use only on fields ≤ 2 acres having a slope of 3% or greater.
19. **Contour strip cropping:** alternating sod strips with row crops grown on the contour reduces wind and water erosion. Use only on fields >2 acres having a slope of 3% or greater.
20. **Build diversion ditch:** a shallow channel built on a gentle grade, across a slope, to intercept water from the slope above and carry it to a safe outlet. Mark only when *"overhead water problem"* is indicated on field sign. Build a diversion ditch should be marked only on Class II through VI land.
21. **Install drainage system** to remove excess surface or subsurface water. Use only on imperfectly or poorly drained soils – Classes III and IV.
22. **Control gullies:** one or more conservation practices that will adequately control runoff and erosion. Gullies are defined as >8 inches across and >6 inches deep and actively eroding.
23. **No mechanical practices needed.** This box *must be marked* when no mechanical practices are necessary.

Lime and Fertilizer Applications

Lime and fertilizer applications are essential for crop and forage production. No set of lime and fertilizer recommendations is suitable for all areas. This section attempts to familiarize contestants with soil fertility requirements. This information is given on the field sign.

24. **Lime:** used to adjust the pH of the soil. Lime is needed on soils with pH ≤ 6.4. Lime is not needed on soils with pH ≥ 6.5 (pH is an indicator of the acidity of the soil).
25. **Nitrogen (N):** application of nitrogen depends on the type of soil and crop being grown. For example, a nitrogen value for production of corn or small grains may be much higher than that required for clovers or alfalfa. The nitrogen availability

in a particular soil is also related to the organic matter content of the soil. Because of these variables, the nitrogen level in each field will be given as sufficient or deficient. If nitrogen is given as deficient on the field sign, number 25 on the scorecard is marked.

26. **Phosphorus (P):** low levels of phosphorus in West Virginia soils are 25 lbs./acre or less. However, soils with phosphorus levels up to 50 lbs./acre do require additions of phosphate (P_2O_5) for maximum production. When any value < 50 lbs./acre is given, check number 26 on the scorecard.
27. **Potassium (K):** West Virginia soils with potassium levels of 60 lbs./acre or less are deficient. However, soils with potassium levels up to 120 lbs./acre do require additions of potash (K_20) for maximum production. When any value < 120 lbs./acre is given, check no. 27 on the scorecard.
28. **No lime or fertilizer needed.** Mark when none of the others (24-27) are marked.

Example: Land Judging Field Sign

FIELD NUMBER _____

Original Topsoil _____ Inches

Depth of Mottles _____ Inches

Field Size _____ Acres

SOIL TEST RESULTS

pH _____ Nitrogen _____

Phosphorus _____ lbs/ac

Potassium _____ lbs/ac

Other Factors:

Example: Land Judging Scorecard (front)

West Virginia University.
EXTENSION SERVICE

Field No. _____

Contestant No. _____

WEST VIRGINIA LAND JUDGING SCORECARD

Name _____

Address _____

SCORE PART I (55 possible points) _____ SCORE PART II (45 possible points) _____ TOTAL SCORE _____

PART ONE – Land Class Factors

(Indicate your answer by placing an X in the proper square.)

A. Surface Texture
1. ❒ Coarse
2. ❒ Moderately Coarse
3. ❒ Medium
4. ❒ Moderately Fine
5. ❒ Fine

SCORE _____

B. Depth (Surface and Subsoil)
1. ❒ Deep
2. ❒ Moderately Deep
3. ❒ Shallow
4. ❒ Very Shallow

SCORE _____

C. Erosion (Water)
1. ❒ None to Slight
2. ❒ Moderate
3. ❒ Severe
4. ❒ Very Severe

SCORE _____

D. Permeability
1. ❒ Rapid
2. ❒ Moderate
3. ❒ Slow
4. ❒ Very Slow

SCORE _____

E. Internal Drainage
1. ❒ Well Drained
2. ❒ Moderately Well Drained
3. ❒ Imperfectly Drained
4. ❒ Poorly Drained

SCORE _____

F. Surface Runoff
1. ❒ Rapid
2. ❒ Moderate
3. ❒ Slow
4. ❒ Very Slow

SCORE _____

G. Slope
1. ❒ (A) Nearly Level
2. ❒ (B) Gently Sloping
3. ❒ (C) Moderately Sloping
4. ❒ (D) Strongly Sloping
5. ❒ (E) Steep
6. ❒ (F) Very Steep

SCORE _____

H. Flood Hazards
1. ❒ None to Slight
2. ❒ Occasional to Moderate
3. ❒ Very Frequent or Severe

SCORE _____

I. Limiting Factors
1. ❒ Texture
2. ❒ Depth
3. ❒ Erosion
4. ❒ Permeability
5. ❒ Internal Drainage
6. ❒ Surface Runoff
7. ❒ Slope
8. ❒ Flood Hazards
9. ❒ None

SCORE _____

J. Limiting Factors
1. ❒ Class I
2. ❒ Class II
3. ❒ Class III
4. ❒ Class IV
5. ❒ Class V
6. ❒ Class VI
7. ❒ Class VII
8. ❒ Class VIII

SCORE _____

Example: Land Judging Scorecard (back)

LAND JUDGING SCORECARD
Part Two – Land Treatments

This is for guidance in the selection of proper land treatments needed for different land classes. Select the practices needed to conserve soil and water, and to maintain or improve productivity.

(Place an X in the proper square for your answer.)

VEGETATIVE

SCORE

_____ ❒ 1. Continuous cropping
_____ ❒ 2. Crop rotation, one year of hay every third year
_____ ❒ 3. Crop rotation, two years of hay every four years
_____ ❒ 4. Long-term rotation, three or more yrs. of hay between crops
_____ ❒ 5. Permanent pasture
_____ ❒ 6. Permanent woodland
_____ ❒ 7. Wildlife or recreation area
_____ ❒ 8. Do not burn crop residues
_____ ❒ 9. Crop production management
_____ ❒ 10. Pasture management
_____ ❒ 11. Protect from burning
_____ ❒ 12. Controlled grazing
_____ ❒ 13. Plant recommended trees
_____ ❒ 14. Harvest trees selectively
_____ ❒ 15. Protect from grazing
_____ ❒ 16. Conservation paintings

MECHANICAL PRACTICES

_____ ❒ 17. Control brush and trees
_____ ❒ 18. Farm on contour
_____ ❒ 19. Contour strip cropping
_____ ❒ 20. Build diversion ditch
_____ ❒ 21. Install drainage system
_____ ❒ 22. Control gullies
_____ ❒ 23. No mechanical practices needed

LIME AND FERTILIZER APPLICATIONS

_____ ❒ 24. Lime
_____ ❒ 25. Nitrogen
_____ ❒ 26. Phosphorus
_____ ❒ 27. Potassium
_____ ❒ 28. No lime or fertilizer needed

SCORE: PART II _____

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