# How Does Your Soil Rate?

TEXAS AGRICULTURAL EXTENSION SERVICE

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This bulletin has been written with the desire to give a better understanding of the soil. It is designed as a guide toward a more uniform method of teaching land evaluation.

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The photographs in this publication were obtained from the Soil Conservation Service.

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## Soil Characteristics and Limitations

### TEXTURE

The texture of a soil indicates its ability to hold moisture and soil nutrients.

Texture refers to the fineness or coarseness of soil particles and is determined by the percentage of sand, silt and clay particles that make up the soil. To determine the texture of a soil, rub moist soil between the thumb and forefinger.

**Coarse-textured** soils are the sands. They do not hold together or will not mold. Coarse-textured soils have a gritty feel, much like sandpaper.

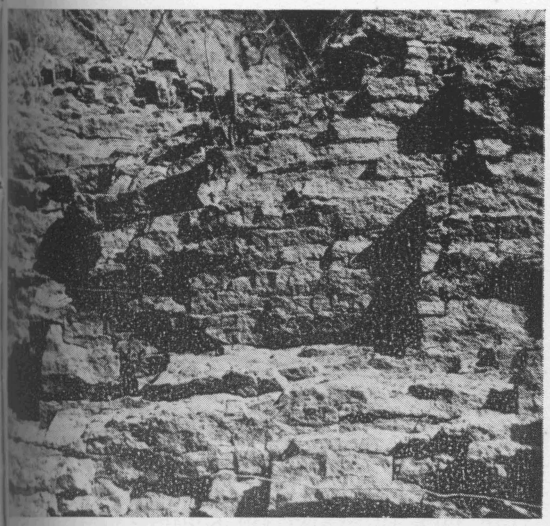
**Medium-textured** soils are the loams except clay loams. Loams are made up of mixtures of sand, silt and clay. They have a smooth feel but are not sticky. Loams hold together when moist but do not "leaf out" when rubbed between the thumb and forefinger.

**Fine-textured** soils are the clays and clay loams. They have a slick feel and are sticky and plastic when wet. Moist clay soils will leaf out when rubbed between the thumb and forefinger.

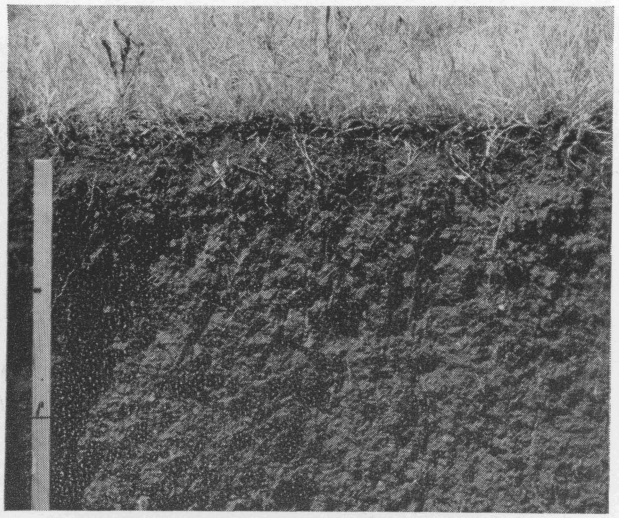
The texture of a soil is determined by the parent material from which it came; therefore, it cannot be changed by practical methods. However, by good soil management practices, its moisture and nutrient-holding ability can be increased. A good farming practice to improve the moisture and nutrient-holding capacity of a soil is a crop rotation system that would add or keep sufficient organic matter in the soil.

### PERMEABILITY

Permeability refers to the rate air, water and roots penetrate the soil. The permeability



Blocky structure indicates very slow permeability.



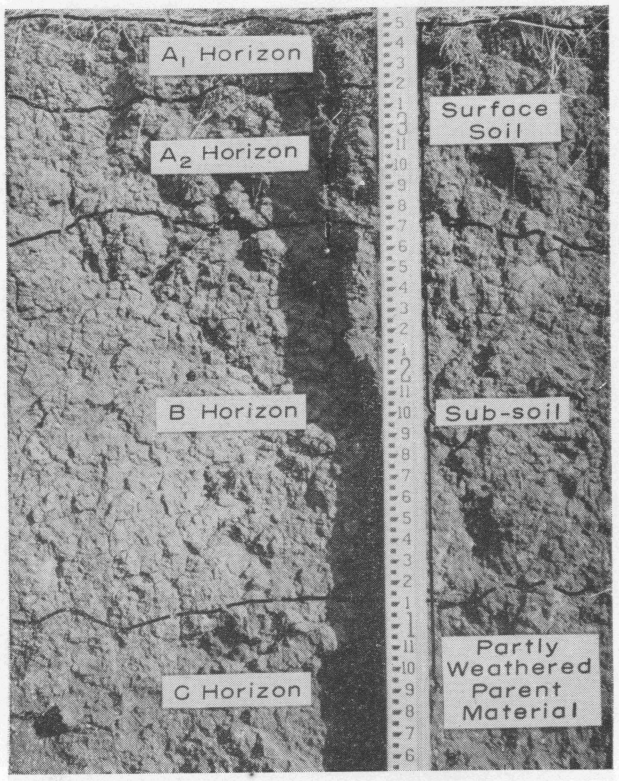
Well-developed rounded granules are of a moderately permeable soil.

rating usually is determined from the character of the subsoil. Each layer of soil has a permeability rating; it is determined by the movement of moisture through the most restricting layer within the effective root zone up to 36 inches deep.

**Very slow permeability** rating is found in soils with claypans, hardpans or heavy clay subsoil layers. The structure is massive or blocky and free from visible pores. The horizontal "cracks" are longer than the vertical ones, giving the profile a brickwall appearance.

**Slow permeability rating** is found in soils with moderately fine-textured subsoils showing granulation. The structure is characterized by medium to fine angular blocks and granules. The difference in length of vertical and horizontal cracks is not noticeable. The units of soil tend to break more easily along the vertical axis than in the very slowly permeable soils.

**Moderate permeability rating** is found in soils ranging from moderately fine to medium in texture. The structure is distinct with well-developed, rounded granules in fine-textured soils; it is not so distinctly developed in the medium-textured soils. Pores are larger and more numerous than in the previous groups.




A deep soil showing surface layer, subsoil layer and partly weathered parent material.

**Rapid permeability rating** is found in soils with sand, loamy sand or gravelly sand layers or subsoils. In general, the structure is single grained.

Permeability is affected by all soil characteristics. It is extremely important because it affects the supply of air, moisture and soil nutrients, and the root growth zone available to the plant. The permeability of a soil is determined by permanent characteristics such as texture and structure. It can be increased or decreased and still remain within the range of each permeability rating.

## DEPTH

Depth refers to the amount of soil over the parent material or above any soil layer that plant roots will not penetrate. Parent material is that material beneath the subsoil from which the surface and subsoil have developed. It may come from bedrock or may have been transported and deposited upon the bedrock.

**Deep soils** have 20 inches or more of soil that can be penetrated by plant roots.

**Shallow soils** have 10 to 20 inches of soil that can be penetrated by plant roots.

**Very shallow soils** have less than 10 inches of soil that can be penetrated by plant roots.

The depth of the soil is important from a land use standpoint. Depth limits the root growth area and the moisture and plant nutrient storage space.

Therefore, soil depth greatly determines the kind of crop to grow. Crops suffer more quickly from lack of water on shallow than on deep soils of the same texture and condition. Level

ing shallow soils for irrigation may be of limited benefit or impractical. The depth may determine the method of terracing used. This is only a partial list of factors dependent upon soil depth.

## SOIL CONDITION

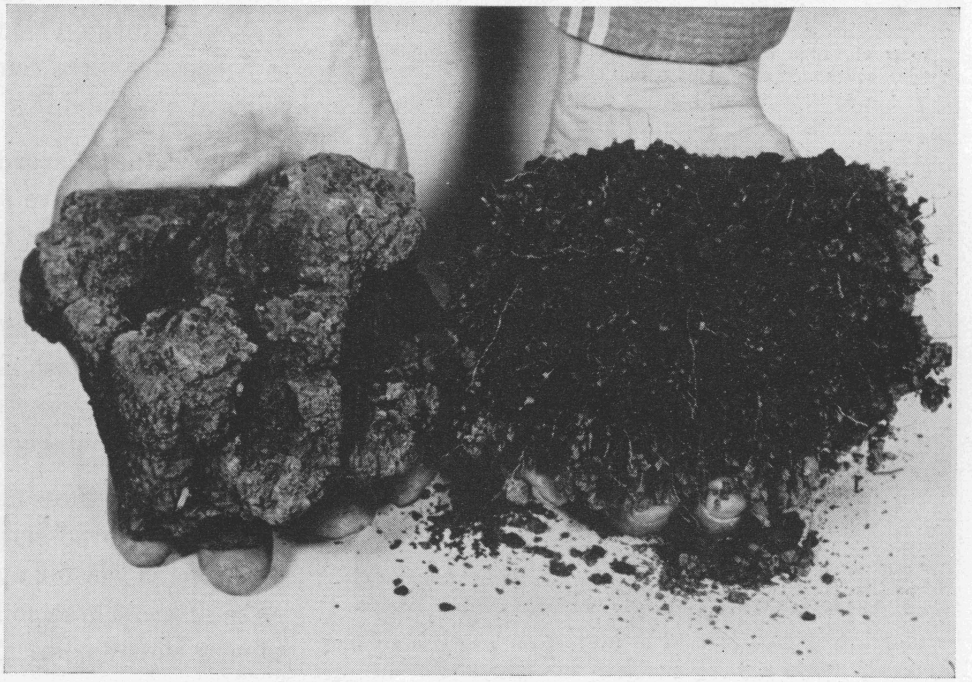
Soil condition refers to its physical characteristics. The degree of condition is expressed as good, fair and poor. These degrees are indicated by the tendency of individual soil particles to cluster into aggregates or crumbs. It includes the size distribution of the pore spaces.

**Good condition** can be applied to a soil that is friable or crumbly. The crumbs should be large enough not to blow away and small enough for good seed germination. Soils in this condition resist compaction by farm machinery. There should be a continuous system of pores to allow moisture penetration and drainage of excess water.

**Fair condition** is applied to soils that show some evidence of compaction. When wet these soils tend to run together; when dry, crusts are formed.

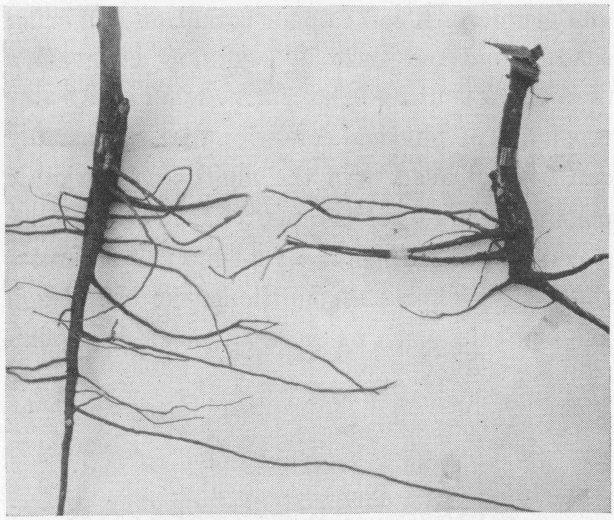
**Poor condition** describes soils that, when wet, run together and puddle forming a structureless mass; or when dry, form large hard cement-like clods or crusts. Sometimes they are referred to as "tight land." When cultivated, they may form excessive crusts, compacted surfaces and compacted layers at plow depth. Poor soil condition is caused by improper tillage practices, compaction, depletion of soil organic matter or the use of salty irrigation water.

A soil high in organic matter content will be spongy, dark colored and normally friable and crumbly. A soil in poor condition will crust readily and pulverize by ordinary cultivation methods, resulting in excessive wind and water erosion. The physical condition of a soil usually can be improved with the addition of organic matter by crop residues, barnyard manure, green manure crops or long-time pasture rotations. Under certain conditions, the use of soil amendments, such as gypsum, may be recommended.



Left, soil in poor condition; right, soil in good condition.

Improper tillage practices and depletion of organic matter result in excessive crusts and cement-like clods.



Roots of cotton plants. On left, soil was in good condition; on right, soil had a compacted layer.

Land with a slope of three to five percent erodes unless it is properly managed.

## SLOPE

The slope is the number of feet fall in 100 feet expressed as percentage. Slope is important in determining land classes. The slope affects (1) the rate and amount of runoff, (2) erosion hazard of the soil and (3) the use and type of farm machinery. High costs prohibits changing the slope except on nearly level land and in areas where irrigation is applicable. Proper management of sloping land by mechanical means and cropping systems reduces the hazards created by slopes. Examples of these practices are contour farming, terracing, sound crop rotation systems, strip cropping, retiring land from cultivation to grazing or forest or combinations of these practices.

## WETNESS HAZARD

Wetness of the soil is the presence within the root zone of free water that interferes with the growth of crops and management practices.

Wetness may be the result of a permanently high water table, temporary high water table, seepage from higher land, nearly level areas where the removal of surface water is slow, nearly level areas with depressions, soils with dense clay subsoils that are slowly or very slowly permeable, or a combination of these conditions.

The wetness hazard refers to the probability that a soil will have enough free water in the root zone to hinder the growth of crops or management practices.

**No wetness hazard** is present on well-drained soils. Soils which show no evidence of trapping or holding excess water in the root zone belong in this category.

**A slight wetness hazard** is present when the water is removed slowly from soil so that the root zone is wet for a short but significant part of the time. These soils commonly have a slow to very slowly permeable layer and a relatively

high water table. Soils that are "cold or late" usually are in this category.

A **moderate wetness hazard** is present when water is removed from the soil so slowly that the root zone is wet for significant periods but not all of the time. These soils are found under poor drainage conditions and are commonly nearly level. They have a slowly permeable layer and high water table. The growth of crops is restricted to a marked degree unless artificial drainage is provided.

A **very wet hazard** is present when the soil remains wet for a large part of the time. The water is removed so slowly that the water table remains at or near the surface during most of the year. Very wet soils usually occupy level or depressed sites and frequently are ponded. Artificial drainage is necessary for the production of field crops (rice is an exception) but will not pay unless other soil characteristics are favorable.

Drainage of excess water from the root zone by the open ditch or underground system is used commonly on soils with wetness hazards. Drainage increases granulation and aeration raises soil temperature, aids helpful soil organisms, decreases erosion and improves the soil-plant-moisture relationship. However, the system must be designed to fit the soil needs so that anticipated returns will make the practice economically sound.

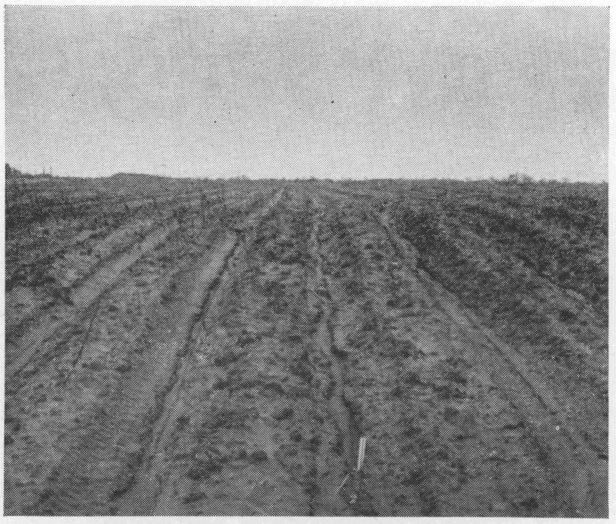
## EROSION

Soil erosion is the detachment and movement of soil materials by wind or water. Erosion consists of two distinct processes—detachment and transportation. Raindrops falling on unprotected soil and soil particles blowing against each other are detachment forces. Water and wind are the transportation forces.

**No-to-slight erosion** - less than 25 percent of the top soil removed. No gullying and no

Slow removal of water from soil may present a slight wetness hazard.

Soil detachment by raindrop.



Soil detachment and transportation by water.

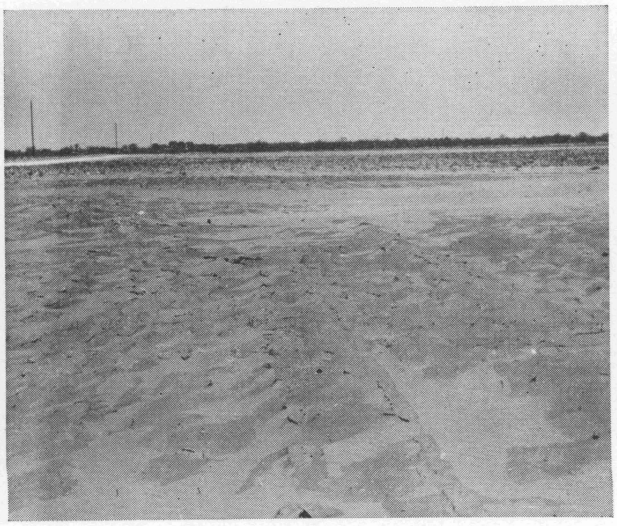
wind accumulations over 6 inches in depth. No apparent erosion.

**Moderate erosion** - (1) removal of less than 25 percent of the surface soil with occasional gullies; or (2) removal of 25 to 75 percent of the surface soil with no gullies; or (3) removal of 25 to 50 percent of the surface soil by wind; or (4) soil accumulations, caused by wind, 6 to 12 inches deep.

**Severe erosion** - (1) removal of 25 to 75 percent of surface soil with occasional gullies; or (2) removal of 75 percent of surface soil to 25 percent of the subsoil with or without occasional gullies; or (3) removal of 50 to 75 percent of the surface soil by wind; or (4) soil accumulations of 12 to 60 inches deep.

**Very severe erosion** - (1) removal of 25 to 75 percent of the surface soil with frequent uncrossable gullies; or (2) removal of 75 percent of surface soil to 25 percent of subsoil with frequent gullies; or (3) removal of all surface soil and over 25 percent of subsoil; or (4) accumulations caused by wind or over 60 inches deep.

The term "gullies" includes both crossable and uncrossable, unless otherwise specified. A crossable gully is one that can be crossed with the usual farm machinery in operation. Frequent gullies are less than 100 feet apart. Occasional gullies are more than 100 feet apart.



Severe wind erosion.

Detachment may be eliminated by preventing raindrops from striking the bare surface by the use of close-growing crops and crop residue mulches, or building up the soil resistance to the detachment by additions of stable organic matter such as barnyard manure or by growing perennial grasses and mature legumes. Practices that decrease detachment also reduce surface runoff and soil erosion.

Practices such as contour tillage, strip cropping, diversion terraces and terrace systems further control the rate of runoff.

Wind erosion can be reduced by decreasing the wind velocity near the surface with barriers of tall close-growing crops, increasing the cloddiness of the surface soil, increasing the clay content of the surface soil or trapping the moving soil particles.

Practices designed to accomplish these goals are permanent vegetation, close-growing crops, mulches, strip cropping or windbreaks, chiseling, deep plowing and listing.

## FACTORS LIMITING PRODUCTION

Many factors limit the productivity of a soil, some of which have been discussed in the preceding pages. Study the soil, determine its characteristics, know their values and arrive at the limiting factors on the basis of soil characteristic rather than on the basis of the use being made of the land.

Examples of factors which may limit production include: (1) available moisture-holding capacity with coarse and medium-textured soils; (2) movement of air, moisture and roots on very slow, slow and rapidly permeable soils; (3) compacted layers and excess crusting; (4) water erosion on soils with more than 1 percent slope that are slowly or very slowly permeable

or on slopes greater than 3 percent that are moderately or rapidly permeable; (5) wind erosion, generally restricted to the medium to coarse-textured soils of West Texas; (6) wetness on a soil with moderate to very wet hazard; (7) low fertility whenever one or more of the major soil nutrients are shown to be low or very low; and (8) slope, when natural rainfall is removed or there is a possibility that it will be removed at a rate that tends to prevent the moisture-holding capacity of the soil from being satisfied.

## LAND CAPABILITY CLASSES

Land-capability classification is the systemmatic arrangement of different kinds of land according to properties that determine the ability of the land to produce on a virtually permanent basis. The classification is made for the purpose of selection and application of land uses and treatments that will keep it profitable for long-time production.

Land is first classed as (1) suited for cultivation and (2) not suited for cultivation. Further classification is made into eight land-capability classes. Four are for land suited for cultivation and four are for land not suited for cultivation. These land classes are separated according to the degree of permanent limitations and hazards in the use and maintenance of the land.

## LAND SUITABLE FOR CULTIVATION

**Class I: Few or No Permanent Limitations.** There are no hazards to the maintenance of this land. It is nearly level with deep, productive soils, subject to little water or wind erosion. It is well drained and is not subject to damaging overflows. Class I land is potentially productive cropland that is capable of intensive cultivation.

**Class II: Moderate Permanent Limitations or Moderate Hazards to its Maintenance.** The limitations of different kinds of Class II land

Perennial grasses are good deep-rooted crops.

include such problems as (1) slight danger of water or wind erosion; (2) soils with shallow depth, (3) soils with fair to poor plant-soil-moisture-air relationships or (4) slightly wet land. These limitations or hazards require attention on the part of the land owner or operator. They may require special practices such as special crops in a rotation, water control practices or tillage methods.

**Class III: Severe Permanent Limitations or Frequent Hazards to the Maintenance of the Land.** The limitations of different kinds of Class III land may be the same as on Class II but are more severe. Therefore, they require more attention and more specific practices to keep the land productive and prevent damage.

**Class IV: Very Severe Permanent Limitations or Very Frequent Hazards.** Land in this class may be cultivated only between long-time or irregular periods of permanent vegetation or may be used for limited cultivation. The cropping use of this is limited by inherent perma-

nent characteristics of the land such as steep slope, unfavorable soil characteristics or adverse climate. Usually it is suited for only occasional cultivation for safe use. Some Class IV land is suited only for specialized grass or tree crops.

## LAND UNSUITABLE FOR CULTIVATION

**Class V: Land Suited for Permanent Vegetation, Grazing or Forestry, with Few or No Permanent Limitations or Slight Hazards.** Cultivation of this class is not feasible because of one or more factors such as overflow hazard, stoniness or wetness. However, it can be used safely for grazing or forestry with good management and no or little damage to the land is probable.

**Class VI: Land Suited for Permanent Vegetation, Grazing or Forestry, with Moderate Permanent Limitations or Moderate Hazards.** This land requires careful management to prevent damage.

**Class VII: Land Suited for Permanent Vegetation, Grazing or Forestry, with Severe Permanent Limitations or Severe Hazards.** It is very steep, eroded, shallow, or otherwise limited but can be used for grazing or forestry if handled with great care. Except under the best management, damage can be expected on this land.

**Class VIII: Land that Has such Extreme Limitations or Hazards that it Is not Suited for Cultivation, Grazing or Forestry Use.** It may be suited for wildlife use, recreational purposes or vegetation for watershed protection.

# Recommended Land Treatments

Recommended land treatments deal with the selection of general treatments and principles that will correct or compensate for factors limiting production, as indicated by basic profile characteristics.

Sorghum grown for its residue is an example of a high residue crop.

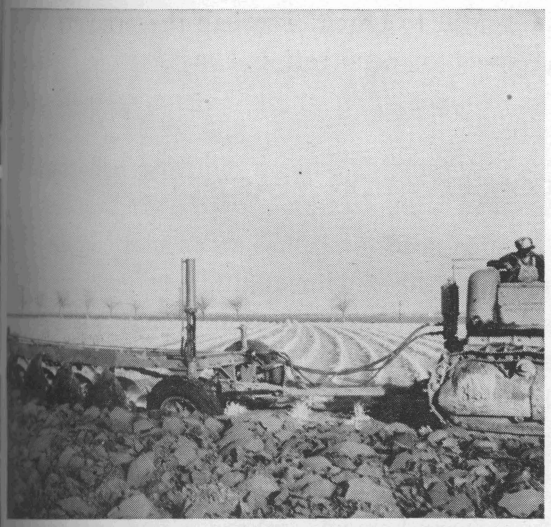
These treatments are divided into five broad groups on the Land Evaluation Score Card. These groups are (1) conditioning, (2) improving, (3) conserving, (4) chemical and (5) cropping practices.

## CONDITIONING PRACTICES

The conditioning practices needed should be determined by the present condition of the soil. The condition of a soil is caused by past use and management practices. The key to selecting soil conditioning practices is found in Part I,D of the Land Evaluation Score Card.

**None needed** applies when the present condition of the soil is good.

**Use deep-rooted crops** when the condition of the soil is fair to poor in the area of the profile below the furrow slice. This practice assists in opening up and adding organic matter to the subsoil by root penetration.



Deep breaking to bring fine-textured subsoil to the surface as a wind erosion control measure.

Use **high residue crops** when there is a fair-to-poor condition in the surface layer only and the subsoil is in good condition.

**Deep break or chisel** normally is not recommended as a single conditioning practice except when used as a wind erosion control measure. Deep breaking or chiseling brings fine-textured or cloddy material to the surface to stabilize the soil.

**Combination of high residue and deep-rooted crops** is recommended when there is fair to poor condition throughout the root zone of the profile. This practice spreads the organic matter throughout the profile and generally improves its condition.

**Deep break and/or chisel plus high residue and/or deep-rooted crops** is recommended for soil in extremely poor condition, as indicated by restricted root zone or low moisture intake. This practice is recommended only when there is evidence that high residue and deep-rooted crops, alone or in combination, will not condition the soil.

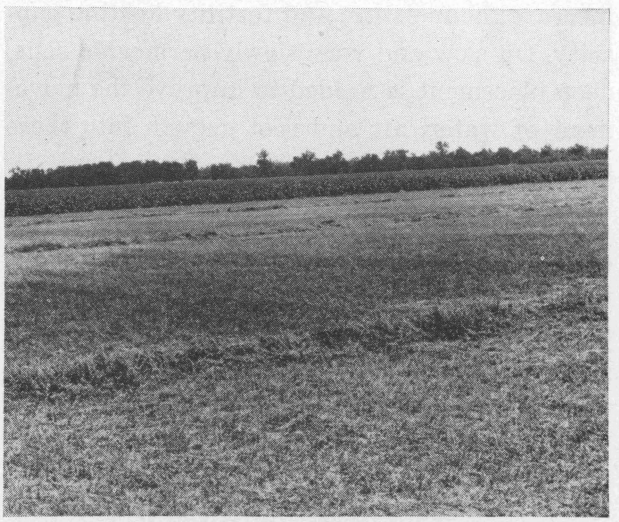
**Provide drainage** on moderately wet or very wet soils to allow excess water in the root zone to be removed so that vegetative conditioning can be established.

## IMPROVEMENT PRACTICES

The use of practices to improve and maintain the moisture-holding capacity, permeability, and the physical condition of the soil are based on the permanent characteristics of the soil.

**None needed** would apply to virgin fine-textured soils that are moderately permeable. These soils require no treatment except a good conservation cropping system.

**Use soil-improving and conserving crops** to improve or maintain moisture and fertility holding capacity and infiltration by the addition of organic matter or by root penetration. The interval of using these crops is affected mainly by the texture of the soil profile. A coarse-textured soil profile has a very low moisture and fertility-holding capacity which normally limits crop yields. The texture cannot be altered but the addition of organic matter every second year or crop tends to improve the above mentioned capacities greatly. A medium-textured profile has a moderate capacity to hold moisture and fertility which can be improved by adding organic matter every third or fourth year or crop. A medium-textured profile includes all medium-textured surface soils and



Deep placement of organic matter by alfalfa roots.

Terraced land should always be farmed on the contour.

coarse-textured surface soils with clay subsoils. A fine-textured soil profile has a high moisture and fertility-holding capacity which must be maintained. Normally, the use of improving and conserving crops every fifth or sixth year or crop will maintain this group of soils in a desirable condition.

**Deep placement of organic matter** by using deep-rooted grasses and legumes is very important on any soil that has an undesirable condition below the furrow slice. The addition of organic matter on a coarse-textured, freely permeable soil should be as deep as possible to increase the moisture and fertility-holding capacity. On slow and very slowly permeable soils, deep placement is needed to improve the movement of water, air and root growth into these restricted layers.

**Shallow placement of organic matter** is recommended for soils that have desirable subsoil condition but need improvement in the surface layer. A coarse-textured surface over a granular clay subsoil would be an example of this condition.

**Breakup hardpan** is used here to indicate the need to crack or break compacted layers and pans. This practice is recommended when there is a need to crack or break these layers to increase root penetration.

## CONSERVATION MEASURES

This section applies to special conservation practices needed in addition to good cropping systems and management. These measures should be based upon the characteristics and limitations found in Part I of the Land Evaluation Score Card.

**None needed** applies to good land, practically free from hazards, where sound management can maintain it.

**Retire to permanent vegetation** is recommended on land that is unsuited for cultivation. Permanent vegetation means perennial plants such as range and pasture grasses, economic forest, refuge for wildlife or permanent vegetation for recreation. The type of permanent vegetation depends upon the soil and the degree of hazards.

**Terrace and farm on the contour** is recommended to remove excess rainfall at a non-erosive rate or to hold the rainfall on the land as long as possible. Terraces generally are recommended only on cultivatable land. Graded or drainage terraces are used in highly intensive rainfall areas, generally on medium to fine-textured soils with moderate or above erosion or erosion danger. This danger may be due to slopes, texture, permeability or a combination of any of these factors. The level terrace generally is recommended in low rainfall areas or medium to fine-textured soils to hold the rainfall on the land long enough for maximum moisture penetration.

Where terraces are recommended, farming on the contour also is recommended.

**Deferred grazing** means resting a pasture or range until sufficient desirable cover is obtained to allow profitable grazing. The length of the deferment period depends upon climate

and soil conditions as well as on the number of seed-supplying plants. Deferred grazing is used to allow an overgrazed range to recover.

**Controlled grazing** means the practice of controlling the number of animal units grazing on a range or pasture. The stocking rate depends on the amount of grass available. This practice should be used to maintain the grass on a range or pasture at a productive level and to maintain a cover to prevent soil erosion.

**Control of undesirable plants** applies to the control of undesirable hardwoods in pine forest, brush and weeds on range and pastureland. These undesirable plants should be controlled to conserve moisture and plant food for use by desirable or profitable plants. Control should not be recommended on land where the cost will be greater than the expected return.

**Trash till or stubble mulch** is the practice of leaving crop residues on or near the surface of the soil. A mulch helps to break the detachment forces of rain and wind and, therefore, reduces wind and water erosion. A mulch also will reduce the evaporation of soil moisture. It can be recommended as a between-crop conservation practice.

Control undesirable plants to conserve moisture for pofitable crops.

Trash tilling or stubble mulching helps reduce the detachment forces of wind and rain.

**Strip crops or windbreaks** are combined here because they perform a similar job. Strip crops are strips of several row widths of close-growing crops, usually planted on the contour. Strips are designed to check the flow of water and permit maximum infiltration of water and deposition of soil material. They are more effective on moderate to rapidly permeable soils that have coarse to medium texture.

Windbreaks are strips of several row widths of tall-growing crops planted at right angles to the prevailing wind. Windbreaks break the force of the wind near the surface, trap moving soil particles and aid in obtaining a stand of interplanted crops.

## FERTILIZING

A soil test is the most accurate means of determining soil nutrient deficiencies. In Texas, most soil analysis give the organic matter, pH, nitrogen, phosphorus, potassium, soluble salts and lime content of the soils. After the soil deficiencies are found, it is necessary to apply the fertilizer properly for best results. The following treatments are based upon soil characteristics rather than plant needs.

**Small frequent applications** are made on soils that are likely to allow the fertilizer to move below the root zone. These soils would be deep, coarse to medium-textured with rapid to moderate permability.

**Large infrequent applications** are made to soils that do not allow the fertilizer to move below the root zones. These soils could be either shallow or deep. The texture generally is medium to fine on deep soils with slow to very slow permeability.

**Concentrated placement** refers to the "banding" of fertilizers, especially when phosphorus is involved. Soils that are highly calcareous or strongly acid have the ability to "tie-up" or render the phosphates insoluble to the extent that they are not available to the plant. The concentrated placement of fertilizers offsets the tying-up because the fertilizer is not mixed throughout the soil. Fine-textured soils are more inclined to tie-up fertilizer than are the medium and coarse-textured soils. In a fine-textured soil, potassium as well as phosphorus may become fixed.

**Broadcast placement** is the practice of mixing the fertilizer throughout the soil. This method may be used where there is no danger of soil nutrient tie-up. It usually is used on coarse to medium-textured soils that are slightly acid to neutral.

## CROPPING SYSTEMS

The soil characteristics indicate the crops and cropping systems that can be used. In selecting a crop, all of the characteristics in Part I and Part II of the Land Evaluation Score Card should be considered.

**Crops with low fertility requirement** are used on shallow soils as well as on those with low fertility and moisture holding and releasing capacities. In most cases, land retired from cultivation would require this type of crop.

**Crops with high fertility requirement** are recommended on the better soils. Deep soils in good physical condition, having the capacity to hold and release moisture and fertility and few hazards would be favorable to high-fertility requirement crops.

**Drouth-tolerant crops** are recommended on soils that have a limited capacity to absorb and hold moisture as well as on soils in a low rainfall area. Examples of such crops would be Sudangrass, guar and some of the range grasses.

**Moisture-tolerant crops** are recommended on soils with a high water table, a wetness hazard of moderate to very wet or soils having an overflow possibility.

**Salt-tolerant crops** are recommended in irrigated areas where there is a possibility of the water containing high percentages of salt.

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# Suggestions for Holding a Land Evaluation Contest

## PREPARATION

### *PLANNING*

The first step in holding a land evaluation contest is the planning meeting. The date, participant eligibility, sponsors, official judges, official graders and other arrangements are settled at this meeting. All groups and agencies interested in the conservation and management of soil and water could be invited to this planning meeting.

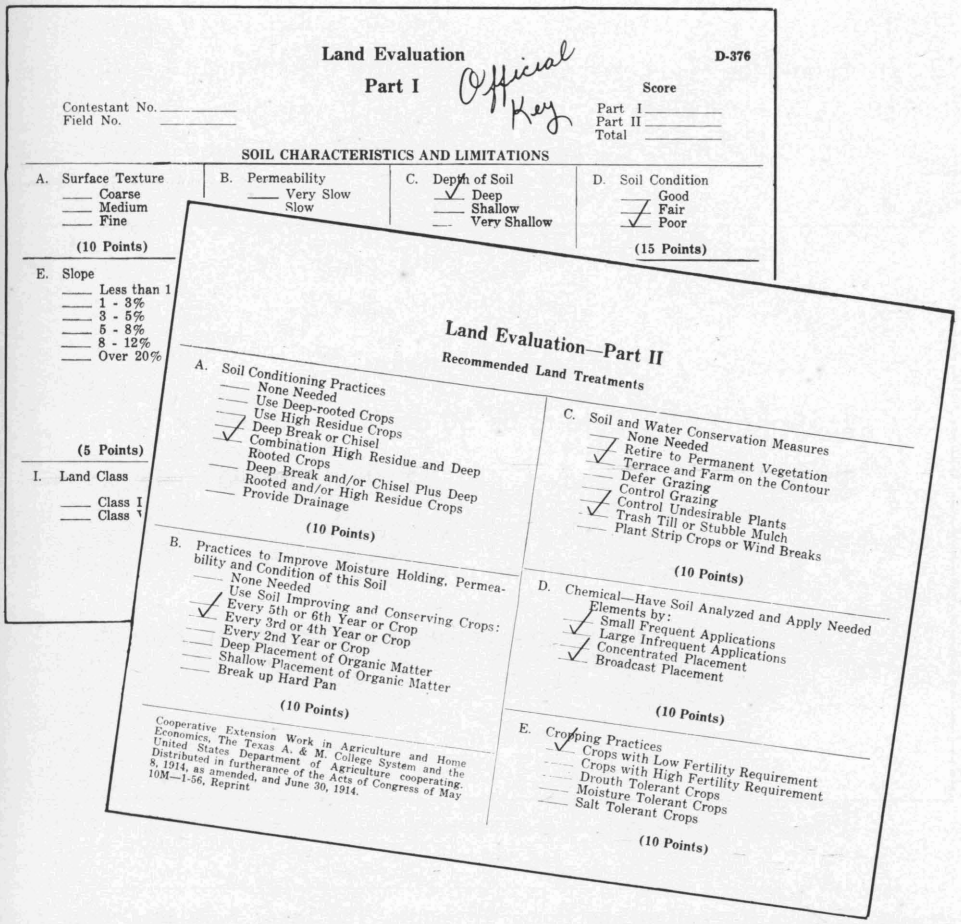
### *SELECTING SITES*

The sites should be selected to contrast as many soil characteristics or problems as possible. After the sites have been selected, an official key should be made.

### *OFFICIAL KEY*

The official key or score card is important and should be made prior to the contest. This key should be made by several individuals, or a committee should be set up as official judges. All official judges should be in agreement as to soil characteristics and management recommendations. If the official judges cannot agree on the correct characteristics of a particular site, another should be selected.

At this official judging, the boundaries of the field, number of limiting factors and other information to be given to the contestants should be agreed upon.



**Land Evaluation** D-376

**Part I** Official Key

Contestant No. _____
Field No. _____

Score
Part I _____
Part II _____
Total _____

**SOIL CHARACTERISTICS AND LIMITATIONS**

A. Surface Texture
___ Coarse
___ Medium
___ Fine
**(10 Points)**

B. Permeability
___ Very Slow
___ Slow

C. Depth of Soil
✓ Deep
___ Shallow
___ Very Shallow

D. Soil Condition
___ Good
___ Fair
✓ Poor
**(15 Points)**

E. Slope
___ Less than 1
___ 1 - 3%
___ 3 - 5%
___ 5 - 8%
___ 8 - 12%
___ Over 20%
**(5 Points)**

I. Land Class
___ Class I
___ Class

**Land Evaluation—Part II**

**Recommended Land Treatments**

A. Soil Conditioning Practices
___ None Needed
___ Use Deep-rooted Crops
___ Use High Residue Crops
✓ Deep Break or Chisel
✓ Combination High Residue and Deep Rooted Crops
___ Deep Break and/or Chisel Plus Deep Rooted and/or High Residue Crops
___ Provide Drainage
**(10 Points)**

B. Practices to Improve Moisture Holding, Permeability and Condition of this Soil
___ None Needed
___ Use Soil Improving and Conserving Crops:
✓ Every 5th or 6th Year or Crop
✓ Every 3rd or 4th Year or Crop
___ Every 2nd Year or Crop
___ Deep Placement of Organic Matter
___ Shallow Placement of Organic Matter
___ Break up Hard Pan
**(10 Points)**

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C. Soil and Water Conservation Measures
___ None Needed
✓ Retire to Permanent Vegetation
✓ Terrace and Farm on the Contour
___ Defer Grazing
___ Control Grazing
✓ Control Undesirable Plants
✓ Trash Till or Stubble Mulch
___ Plant Strip Crops or Wind Breaks
**(10 Points)**

D. Chemical—Have Soil Analyzed and Apply Needed Elements by:
✓ Small Frequent Applications
___ Large Infrequent Applications
✓ Concentrated Placement
✓ Broadcast Placement
**(10 Points)**

E. Cropping Practices
✓ Crops with Low Fertility Requirement
___ Crops with High Fertility Requirement
___ Drouth Tolerant Crops
___ Moisture Tolerant Crops
___ Salt Tolerant Crops
**(10 Points)**

The official key should be prepared by an official scoring committee prior to the contest.

*FIELD CARDS, GUIDES AND SITE PREPARATION*

Field cards or site cards should be made in advance of the contest. These cards should contain the site number, boundary information, type of farm, soil analyses and other pertinent information the official judges deem necessary.

Group guides should be designated and shown the location of all sites prior to the contest and instructed as to type of information, if any, they are to give the contestant.

The day before the contest, pits should be dug on the site. The pits should be dug to parent material on shallow and very shallow soils or more than 30 inches deep on deep soils and of sufficient size to give the contestant a good view of the soil profile. The field cards should be posted near the pits.

## EXECUTION OF CONTEST

*REGISTRATION*

The contestants should be registered on a master tally sheet. At this time they can be given a contestant number and a score card for each site. The contestants should be divided into units where no two members of a team are in the same group. This may be done by the use of color groups or alphabet groups.

The contestants should be turned over to the group guides. The guides should be instructed as to the amount of time to spend at each site and the order in which they are to visit the sites.

*SUGGESTIONS*

(1) A contest should have at least three sites, preferably four.

(2) Score cards should be turned in at the completion of the judging of each site and taken to the grading committee.

(3) The time at each site is generally 10 to 20 minutes, depending on the size of the group.

(4) Small groups (10 to 20) are easier to handle.

(5) The official grading committee should be held responsible for recording and totaling the scores and announcing the winners.

Field Number 3

1. Boundary is indicated by stakes.
2. Consider the field to be 50 acres in a livestock farm.
3. Soil analysis shows pH 7.7, Nitrogen-low, Phosphorus—low, Potash—high.
4. Select 3 factors limiting production.
5. Select the following number of practices in Part II.

| | | |
|---|---|---|
| A—1 | C—2 | E—1 |
| B—2 | D—2 | |

Suggested field or site card gives information needed by the contestant.

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