Bulletin No. 222 July, 1951

SOIL MANAGEMENT FOR LAWRENCE COUNTY FARMS ACCORDING TO THEIR SOIL RESOURCES

THE UNIVERSITY OF TENNESSEE
AGRICULTURAL EXPERIMENT STATION
Knoxville

LEGEND: MANAGEMENT REQUIREMENT GROUPS

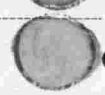
Color representing management group on maps	Management Group
 ☐	Group 1—Nearly level well-drained to imperfectly drained soils of the bottom lands (See page 5)
 ☐	Group 2—Undulating soils of the young colluvial (local bottoms) and terrace (second-bottom) lands (see page 7)
 ☐	Group 3—Undulating and well-drained red soils (see page 9)
 ☐	Group 4—Rolling red and yellowish-red soils (see page 11)
 ☐	Group 5—Undulating well or moderately well drained yellowish-brown or brownish-yellow soils (See page 13)
 ☐	Group 6—Rolling non-cherty yellowish-brown or brownish-yellow soils; not severely eroded (See page 16)
 ☐	Group 7—Rolling and undulating cherty yellowish-red to brownish-yellow soils (See page 18)
 ☐	Group 8—Nearly level to undulating imperfectly to moderately well-drained yellow soils (See page 20)
 ☐	Group 9—Nearly level to depressional poorly drained gray soils (See page 21)
 ☐	Group 10—Rolling yellowish-brown or brownish-yellow soils, severely eroded; hilly yellowish-brown soils, not severely eroded; and hilly red soils and steep red soils, not severely eroded (See page 23)
 ☐	Group 11—Severely eroded hilly yellowish-brown and steep red soils; steep yellow soils, not severely eroded; and miscellaneous land types (See page 25)

TABLE OF CONTENTS

THE REPORT AND HOW TO USE IT

This report was written primarily for the farmers of Lawrence County. The information on the maps and in the text should be an effective aid to the farmer in the preparation of a good farm plan — one which will maintain and improve the soils and at the same time provide the best possible living for the farm family.

The first step in using this report is to turn to the map of your farm and note the numbers of your soil types. The name of each soil type is shown in the "legend" on pages 44 to 47. Many different kinds of soil are recognized in the detailed soil survey. They need to be grouped for particular purposes. The groups shown in color on the map combine soils that are similar in their use suitability and management requirements. The legend on the page opposite the map identifies the different groups.

To find out what are considered to be suitable uses and management practices for a particular soil or group of soils, turn to pages referred to opposite the management group in the legend and read what is said about the group. The principles of good soil management and some good management practices that apply to all or most of the soils of the county are discussed on pages 5 to 26.

High crop yields year after year are the result of good soil and good management. Low yields may be caused by some soil deficiency, by faulty management, or by trying to grow crops that are not adapted to the soil. The tables included with the management group discussions show what yields can reasonably be expected from Lawrence County soils, as an average over a period of years under good management. If you find that your average yields for five years or longer are much below those shown in the tables for your soil type, it will pay to examine your management practices to see where improvement may be made. Improved varieties, better fertilizer practices, or other improved farming practices make it possible to obtain higher yields than those predicted. On the other hand, new plant diseases or insect pests may result in reduced yields. A period of several years under good management is generally required to raise the yields on a depleted soil to those given in the tables.

If you are interested in the identification and relationships among your soils, see the key to the soil series, page 48. The county agricultural workers can give you more specific use and management recommendations for the individual soils than are given for the soil groups in this report.

SOIL MANAGEMENT FOR LAWRENCE COUNTY FARMS ACCORDING TO THEIR SOIL RESOURCES

Lawrence County is predominantly agricultural. Farms are generally small and production on a great many is primarily for home use. The cotton farm and the small general farm are the most common types in the county. Practically all farms have some livestock, but livestock and livestock-products are the major source of income on a limited number of farms. About 48 per cent of the land area is in forest, and forest products are an important source of income. Sale of cotton constitutes over 50 percent of the income for the county.

The soils of Lawrence County differ greatly in color, texture, acidity, fertility, relief, stoniness, depth, drainage, and other characteristics. All of these characteristics affect the suitability of the soils for different agricultural uses. The 36 percent of farm land reportedly used for crops includes the greater part of the crop-adapted soils as well as some not adapted to crops. Many acres in cultivated crops are better suited for permanent pasture, and many cultivated areas need improved management if crop yields are to be maintained. Some land now in permanent pasture is suited to cultivated crops, but most of it is best left in pasture. Some should be reforested. Also, a large acreage now in woods is well suited to crop and pasture production. Erosion and low crop yields are common symptoms of poor land use or faulty management which may, in turn, be due to economic maladjustments beyond the control of individual farmers.

The average farm in Lawrence County contains about 80 acres and has only about 50 acres available for crops and pasture. Some farms are large enough to make major adjustments in land use; on others, however, the limited acreage available and the low productivity of the soils make it difficult under the present level of management to use the soils for the uses to which they are best suited and still obtain the production necessary to maintain the farm family adequately. Improved management would increase crop yields on practically all soils and make possible desirable shifts in land use not possible at lower levels of production.

What crops are adapted to each soil? What treatment does each soil need? What yields may be expected? This report attempts to answer these and other questions for the farmers of Lawrence County.

USE AND MANAGEMENT OF SOIL GROUPS

In the following discussions of the soil groups, all the available specific information about soil use and management is presented. As new information regarding the use and management of

the soils is assembled, it will be made available to the farmers through the county agent. Additional information in soil and crop management is continuously being accumulated by the Agricultural Experiment Station and Extension Service in Knoxville, Tennessee. This information is released through their publications, which can be obtained from your local county agent.

It is recognized that certain of the management practices suggested for the various soils may not be feasible for all farmers in the county under present conditions. Each farm has circumstances peculiar to itself; some of these may dictate combinations of management practices better suited to a particular farm than those outlined in this section. Whenever possible, several alternatives are suggested from which to choose.

Group 1. — Nearly level well-drained to imperfectly drained soils of the bottom lands and average expected crop yields under specified management.

	Soil	Corn (bushels)	Cotton (pounds)	Wheat (bushels)	Rye (bushels)	Lespedeza (tons)	Alfalfa (tons)	Soybeans (bushels)	Pasture (cow-acre-days)
12	Ennis silt loam	70	x	x	x	1.6	x	30	150
10	Ennis cherty silt loam	50	x	x	x	1.4	x	25	125
14	Lobelville silt loam	55	x	x	x	1.3	x	25	140
13	Lobelville cherty silt loam	42	x	x	x	1.2	x	20	115

This group consists of moderate to good crop and pasture soils. All are comparatively fertile and produce moderate yields of crops to which they are adapted without the use of amendments. Compared to most of the upland soils, they are moderately well supplied with lime, organic matter, and plant nutrients and receive frequent additions of fresh sediments from overflow of adjacent streams. The moisture-supplying capacity for growing plants is very high. Practically all have favorable tilth which is easily maintained. Some areas contain sufficient chert to interfere materially with tillage.

Suitable uses: Frequent winter and early spring flooding limit the crops that can safely be grown on these soils. They are very well suited to corn, summer annual hay crops, soybeans, and grain sorghums. They are poorly suited to alfalfa, although this crop is grown successfully in places. Red clover is apparently better suited usually. Cotton generally makes an excessive stalk growth and is slow to open and, for these reasons, is generally not grown on these soils. Small grains are more susceptible to lodging and disease and generally mature later than on soils of the uplands. These soils are well suited to pasture production as they remain relatively moist and productive through hot, dry periods. White

clover and Ladino clover are well suited. Orchardgrass is well suited on the Ennis soils, and fescue is also very well suited, especially on the Lobelville soils.

Management requirements: The selection of adapted crops is very important in management of these soils. Although the adapted crops can be grown successfully almost continuously, a short rotation is desirable on most farms. A corn-hay rotation should be well suited. A corn-vetch or crimson clover-corn rotation is successfully followed on many farms. Vetch or vetch and rye to be pastured and turned under for green manure can be sown between the corn rows. Growing winter legumes, such as vetch and crimson clover, and plowing them under as green manures in the spring should prove beneficial, especially where corn is grown every summer. A corn-soybeans or corn-soybeans-red clover and grass rotation can be followed on most farms. On the fields that are least susceptible to flooding, a sequence of soybeans-wheat-crimson clover would be suitable.

Although fair to good crop yields are obtained without amendments, most of the soils are very responsive to fertilization. Lime and phosphate are generally required to establish and maintain red clover and are beneficial to other crops, especially the legume crops. A good response from practically all crops is expected from the use of phosphate. A moderate application of potash may be needed for some crops, but this need will largely depend on the crop grown and the previous cropping system. A legume in the rotation generally supplies enough nitrogen for moderate yields, especially for the first crop in the rotation following the legume, but nitrogen fertilizers will be needed to maintain high corn yields particularly under continuous row cropping. Organic matter will need to be maintained by use of crop residues, green manure, or barnyard manure on areas not subject to beneficial silting.

Special tillage or cropping practices for the maintenance of tilth or water control are not generally necessary. Good tilth is easily maintained and the soils can be tilled over a wide range of moisture conditions without serious injury. It may be necessary to use hedges, levees, or diversion ditches to protect the soils from flood currents and runoff from higher land. A drainage system that includes open ditches, diversion ditches, levees, or bedding or even tile may be advisable on some areas of the Lobelville soils.

Even though the soils of this group are very well suited to the production of pasture, they are seldom used for this purpose because they are so well suited to more intensive cropping. The fact that they are less drouthy than most other soils makes them especially valuable for summer pasture. Mowing is necessary to re-

move excess herbage and undesirable plants. Weed control may be difficult on areas which are cherty enough to interfere with mowing. The spreading of droppings is important on productive, heavily grazed pastures. Overgrazing should be avoided.

Group 2. — Gently sloping soils of the young colluvial (local bottoms) and terrace (second-bottom) lands and average expected crop yields under specified management.

Soil	Corn (bushels)	Cotton (pounds)	Wheat (bushels)	Rye (bushels)	Lespedeza (tons)	Alfalfa (tons)	Soybeans (bushels)	Pasture (cow-acre-days)
2 Emory silt loam	75	650	25	17	1.8	3.5	32	165
6 Greendale silt loam	70	600	21	16	1.6	3.0	28	150
7 Greendale cherty silt loam	50	350	17	15	1.4	2.6	24	125
29 Humphreys silt loam	65	450	20	15	1.6	3.2	26	145
30 Humphreys cherty silt loam	46	350	18	14	1.4	2.7	24	120
4 Lobelville silt loam, local alluvium phase	60	450	16	14	1.5	x	27	140

This group consists of good crop and pasture soils. They are relatively fertile, easy to work and conserve, and productive of most of the crops commonly grown. These soils are not ordinarily susceptible to flooding, and for this reason have a wider range in crop adaptation than those of group 1. All are deep, permeable soils with favorable moisture conditions. Most of the soils included in this group are well drained, but the Lobelville and some areas of the Greendale soils are imperfectly drained, and on these, moisture conditions are less favorable in wet seasons. The content of organic matter and plant nutrients is moderate to high compared with Lawrence County soils, as a whole. Although not susceptible to flooding, all except the Humphreys soils do receive some sediments from the adjacent slopes which tend to replenish the content of plant nutrients and organic matter.

Suitable uses:—These soils are adapted to a large number of crops including corn, hay, vegetable crops, tobacco, red clover, and soybeans. All soils of this group are very well suited to such pasture plants as orchardgrass, fescue, and white and Ladino clovers.

Management requirements: The soils of this group are suited to intensive use for crop production. Although good yields are obtained under almost continuous row-cropping, a short rotation is desirable on most farms. A rotation of corn-wheat-red clover

and orchard grass appears to be well suited. Cotton or potatoes can be substituted for the corn and oats or barley for the wheat. Alfalfa can be substituted for the red clover on some areas, but this would require a longer rotation. On some farms, it may be necessary to use these soils almost continuously for row crops. On these farms, a rotation such as corn-vetch and rye or grain sorghum-oats-crimson clover or vetch is advisable. Cotton, potatoes, or any vegetable crop may be substituted for the corn.

The soils of this group give an excellent response to proper and adequate fertilization.* Nitrogen is a general fertilizer requirement for corn and other non-legumes, even where legumes are included in the rotation. Phosphate is also generally required for high yields of most crops. Potash is less likely to be deficient, but it may be required for some crops. Although none of the soils are especially low in lime, the application of this material generally will prove beneficial. On most areas, lime will be necessary for the successful growth of such crops as red clover and alfalfa. Where these soils are used intensively for row crops, maintenance of organic matter will require turning under of green manure crops and crop residues, or additions of barnyard manure. Small grains may lodge on these soils in some years.

The control of runoff is not a problem except in a few places where the soils receive excess water from the slopes above. In such places there is danger of injury from erosion and also from deposition of infertile material washed from the slopes above if they are eroding rapidly. Diversion of the runoff from such slopes may be desirable. Good tilth is easily maintained on these soils and tillage operations can be carried on over a fairly wide range of moisture conditions.

These soils are highly productive of pasture, and the fact that they remain relatively moist and productive throughout hot, dry periods makes them especially valuable for summer pasture. Properly fertilized, they are well suited to a mixture of orchardgrass or fescue and white or Ladino clovers. If used for above pasture mixtures, phosphate, potash and lime will probably be needed, especially on the Lobelville and Greendale soils. Other management requirements include control of grazing, the scattering of droppings and occasional mowing to remove excess herbage and undesirable plants.

* See the county agricultural agent regarding the testing of soils for available plant nutrients and for specific lime and fertilizer recommendations.

Group 3.—Undulating well-drained red soils and average expected crop yields under specified management.

	Soil	Corn (bushels)	Cotton (pounds)	Wheat (bushels)	Rye (bushels)	Lespedeza (tons)	Alfalfa (tons)	Soybeans (bushels)	Pasture (cow-acre-days)
43BL	Bewleyville silt loam, undulating phase	60	575	22	16	1.5	3.2	24	145
43BN	Bewleyville silt loam, eroded undulating phase	51	525	20	15	1.3	3.0	21	140
44BL	Bewleyville silt loam, undulating shallow phase	52	525	21	15	1.4	3.0	23	130
44BN	Bewleyville silt loam, eroded undulating shallow phase	46	500	19	14	1.2	2.8	18	125
42BL	Decatur silt loam, undulating phase	66	625	26	18	1.7	3.8	30	160
42BN	Decatur silt loam, eroded undulating phase	60	575	24	16	1.5	3.5	27	145
32BN	Decatur silty clay loam, eroded undulating phase	55	575	24	16	1.5	3.5	25	145
41AL	Pembroke silt loam, level phase	72	650	26	18	1.8	3.8	32	165
41BL	Pembroke silt loam, undulating phase	70	650	26	18	1.7	3.8	30	160
41BN	Pembroke silt loam, eroded undulating phase	62	600	24	16	1.5	3.5	27	145
22BL	Pickwick silt loam, undulating phase	62	600	24	17	1.6	3.4	24	145
22BN	Pickwick silt loam, eroded undulating phase	55	550	22	16	1.4	3.2	21	140

This group consists of good crop and pasture soils. All soils of the group are well drained and have a moderately high water-supplying capacity. Compared with other cropped soils of the uplands, they are relatively high in organic matter and plant nutrients. They are medium to strongly acid. The present content of plant nutrients, especially nitrogen, depends largely on the past cropping system and loss of soil material by erosion. They occupy 2 to 5 percent slopes and are moderately susceptible to erosion. They vary considerably in the ease with which they can be tilled and the ease with which good tilth can be maintained. The Decatur soils cannot be worked over so wide a range of moisture conditions as other soils of the group, and they also require considerably more power for tillage operations.

Suitable uses: These soils are well suited to practically all the crops commonly grown in the county. With proper fertilization and liming, the group includes some of the best soils in the county for the production of alfalfa and red clover. They are better suited to corn than most of the other soils of the upland. Crops commonly grown for which they are well suited include corn, cotton, tobacco, alfalfa, red clover, crimson clover, vetch, soybeans, strawberries, and small grains. They are also well suited for the better quality pasture plants, as orchardgrass, fescue, Ladino and white clover.

Management requirements: The soils of this group are suited to rather intensive use for crop production. When other management requirements are met, it appears that they can be conserved

and their productivity maintained or increased under rotations including a row crop every other year or every third year. Row crops should not be grown more than two years in succession and preferably not more than one. In planning the choice and rotation of crops, it should be kept in mind that these soils are very well suited for the production of such exacting deep-rooted legume crops as alfalfa and red clover. A rotation of corn-small grain-red clover and grass should be well suited to these soils. Any of the truck crops or tobacco can be substituted for the corn in this rotation. A more intensive cropping system would include corn (vetch)-cotton-wheat-red clover and grass. A rotation well suited for the dairy farmer includes corn (vetch)-corn-small grain-alfalfa (4 years). For the less erosive soils of the group, the following cropping systems may be desirable:

1. Grain sorghum-oats and crimson clover.
2. Grain sorghum-button clover.
3. Soybeans-wheat with lespedeza-crimson clover and barley.

These soils are generally slightly to moderately deficient in lime, phosphorus, nitrogen, and possibly potash for high yields of most of the crops commonly grown.* The crop response to fertilization is excellent. Applications of lime and phosphate are necessary for the successful growth of such legumes as alfalfa and red clover and will increase the yields of other legume crops, including lespedeza. Nitrogen fertilizer is required for high yields of practically all crops except legumes, but the crops immediately following legumes would need less nitrogen. Practically all crops give a good response to applications of phosphate. The cotton, tobacco, and legume crops also need potash fertilization. The crop following a high-yielding hay crop may need a potash fertilizer. An application of 400 to 600 pounds of a high-grade complete fertilizer, as a 6-12-12 is desirable on vegetable crops, tobacco, and potatoes.

Soil and water losses are not serious problems where crops are properly chosen and adequate amendments are used. It appears that contour tillage is desirable wherever feasible, but terraces are not generally needed except on some of the longer slopes where row crops are grown at frequent intervals.

These soils are well suited to pasture, but applications of lime and phosphate are necessary to obtain high-yielding pastures of good quality. Properly controlled grazing and fertilization are helpful in controlling weeds, but mowing is also necessary. Properly fertilized, the soils are productive of all common pasture plants, as orchardgrass, fescue, white, Ladino, and red clovers, alfalfa, and lespedeza.

Group 4.—Rolling red and yellowish-red soils and average expected crop yields under specified management.

* See the county agricultural agent regarding the testing of soils for available plant nutrients and for specific lime and fertilizer recommendations.

Group 4

Soil	Corn (bushels)	Cotton (pounds)	Wheat (bushels)	Rye (bushels)	Lespedeza (tons)	Alfalfa (tons)	Soybeans (bushels)	Pasture (cow-acre-days)
132CN Ashburn cherty silt loam, eroded rolling phase	46	475	20	15	1.2	3.0	19	125
132CP Ashburn cherty silty clay, severely eroded rolling phase	30	315	12	12	.8	1.8	x	85
132BN Ashburn cherty silt loam, eroded undulating phase	50	500	21	16	1.3	3.2	20	130
36BL Baxter cherty silt loam, undulating phase	42	425	18	15	1.2	2.6	14	115
36BN Baxter cherty silt loam, eroded undulating phase	38	375	16	14	1.1	2.4	12	105
36CL Baxter cherty silt loam, rolling phase	38	375	16	14	1.1	2.4	12	105
36CN Baxter cherty silt loam, eroded rolling phase	34	325	14	14	1.0	2.2	10	95
36CP Baxter cherty silty clay loam, severely eroded rolling phase	x	225	10	11	.7	1.6	x	65
44CL Bewleyville silt loam, rolling shallow phase	46	500	19	14	1.2	2.8	18	125
44CN Bewleyville silt loam, eroded rolling shallow phase	40	450	17	13	1.1	2.4	16	110
44CP Bewleyville silty clay loam, severely eroded rolling shallow phase	27	300	11	13	.8	1.7	x	75
42CL Decatur silt loam, rolling phase	60	575	24	16	1.5	3.5	27	145
42CN Decatur silt loam, eroded rolling phase	55	525	22	16	1.4	3.3	24	135
32CN Decatur silty clay loam, eroded rolling phase	50	515	22	16	1.4	3.3	24	135
CP, 32CP Decatur silty clay loam, severely eroded rolling phase	35	350	15	14	1.0	2.1	x	95
18BL Minvale cherty silt loam, undulating phase	50	525	21	16	1.4	3.0	23	130
18BN Minvale cherty silt loam, eroded undulating phase	45	500	19	14	1.2	2.8	18	125
18CL Minvale cherty silt loam, rolling phase	45	500	19	14	1.2	2.8	18	125
18CN Minvale cherty silt loam, eroded rolling phase	40	450	17	13	1.1	2.4	15	105
18CP Minvale cherty silty clay loam, severely eroded rolling phase	22	260	10	11	.7	1.6	x	65
22CL Pickwick silt loam, rolling phase	55	550	22	16	1.4	3.2	21	140
22CN Pickwick silt loam, eroded rolling phase	50	500	20	15	1.2	2.8	19	125
22CP Pickwick silty clay loam, severely eroded rolling phase	32	335	13	13	.8	1.8	x	85

This group includes moderately good crop and pasture soils that differ from those of group 3 in having stronger slopes, 5 to 12 percent gradient, and in being more eroded. Some cherty soils are included. The amount of surface runoff is higher and the rate is more rapid, resulting in a greater susceptibility to soil and water losses. This hazard increases the severity of the conservation problem; the stronger slopes also increase somewhat the difficulty of tilling the soils. The water-supplying capacity for plants is somewhat lower on the moderately eroded and much lower on the severely eroded soils; it is also generally somewhat lower on the cherty soils of the group. The more severe the erosion, the more difficult the soil to till and the narrower the range in moisture conditions at which it can be tilled safely.

Suitable uses: These soils are suited to practically all of the crops commonly grown. They are well suited to most hay crops, including alfalfa, but are not as well suited as the soils of group 3 to row crops or to close-growing crops that require annual seedbed preparation. Crops for which satisfactory yields can be expected under good management include corn, cotton, tobacco, alfalfa, red clover, crimson clover, vetch, and all small grains. Pasture plants, such as Ladino and other white clovers, orchardgrass, and fescue are well suited.

Management requirements: Due chiefly to the stronger slopes and greater susceptibility to erosion and excess runoff, the soils of this group cannot be used as intensively as those of group 3. The rotation will need to include fewer row crops and more close-growing crops. Row crops need to be alternated with close-growing crops, and frequent growth of deep-rooted crops is beneficial. Observations indicate that a row crop may be safely grown once every 3 to 6 years if fertilization and other management practices are good. Row crops should not be grown more than one year in succession. A rotation consisting of corn, small grain with vetch, alfalfa (4 years) appears to be very well suited to these soils. A rotation of corn (or cotton)-wheat; red clover with orchard grass is also well suited. With proper fertilization and a suitable water-control system, practically all of the rotations suggested for group 3 can be used. It may be advisable not to include a row crop in the rotation on the severely eroded soils until a water-control system has been established and the fertility level raised. A cover crop should follow all clean-cultivated crops. Grass-legume mixtures need to be grown periodically to aid in the maintenance of the suppy of organic matter. If a sod crop is not included in the rotation, green manuring is another alternative.

These soils are deficient in lime, phosphate, and nitrogen for continued high yields of most crops.* Lime and phosphate addi-

* See the county agricultural agent regarding the testing of soils for available plant nutrients and for specific lime and fertilizer recommendations.

tions are needed especially for legumes and grasses. Nitrogen is a general requirement except where it is supplied by legumes. Potash application is generally needed for alfalfa, cotton, and tobacco, but its need by other crops is dependent to a large extent on the past cropping history. Good fertilization is needed not only for increased crop yields but also to aid in erosion control through establishment of vegetative cover.

Tillage on severely eroded areas is difficult unless the moisture content of the soil is just right, but good tilth is easily maintained on the uneroded soils. The growing of grasses, deep-rooted legumes, and green manure crops tends to improve tilth conditions. Fall plowing may result in improvement of tilth but is likely to increase erosion appreciably.

Contour tillage, which aids materially in conserving soil moisture and reducing erosion, is advisable wherever feasible. Terracing is advisable on most of these soils where row crops are to be grown frequently if suitable outlets are available. Strip-cropping may be desirable on the longer slopes where terraces are impractical. However, terracing or strip cropping may not be necessary except on the more severely eroded soils, if management is otherwise good. Filling of gullies with a bulldozer may be feasible in places.

These soils are very well suited to pasture, but owing to the less favorable moisture supply, they are not as productive as the soils of groups 2 or 3. Excellent response is obtained from the use of lime and phosphate. Pasture is somewhat difficult to establish, especially on the more severely eroded spots and here applications of barnyard manure aid greatly. Nitrogen fertilizers aid greatly in establishing the pasture where manure is not available. After the pasture is established, the legumes in the pasture mixture should supply most of the nitrogen needed for high yields. A mixture of orchardgrass and Ladino or white clover is well suited if a high fertility level is maintained; redtop and lespedeza are easier to establish and maintain at low fertility levels. Other good management practices include clipping to control undesirable plant growth, and the control of grazing.

Group 5.—Undulating yellowish-brown or brownish-yellow soils and average expected crop yields under specified management.

The soils of this group are fair to good cropland and pasture land. They are easy to till, but more difficult to maintain in a productive state than soils of groups 1 to 4. Surface runoff is slow and the soils are only moderately susceptible to erosion. Internal drainage is slow to moderate and the water-supplying capacity is moderately low. The content of plant nutrients is low to very

Group 5

	Soil	Corn (bushels)	Cotton (pounds)	Wheat (bushels)	Rye (bushels)	Lespedeza (tons)	Alfalfa (tons)	Soybeans (bushels)	Pasture (cow-acre-days)
48BL	Dickson silt loam, undulating phase	46	450	18	14	1.3	x	20	110
48BN	Dickson silt loam, eroded undulating phase	42	425	17	13	1.2	x	18	100
47AL	Dickson silt loam, level dark-surface variant	50	500	20	15	1.5	x	22	120
47BL	Dickson silt loam, undulating dark-surface variant	50	500	20	15	1.4	x	22	120
47BN	Dickson silt loam, eroded undulating dark-surface variant	46	475	18	14	1.2	x	19	115
45BL	Mountview silt loam, undulating phase	52	525	20	16	1.4	2.8	22	120
45BN	Mountview silt loam, eroded undulating phase	48	500	18	15	1.2	2.6	19	115
46BL	Mountview silt loam, undulating shallow phase	42	425	17	15	1.2	2.5	18	110
46BN	Mountview silt loam, eroded undulating shallow phase	38	400	16	15	1.1	2.2	16	100
17BL	Pace silt loam, undulating phase	48	475	18	15	1.3	x	20	110
17BN	Pace silt loam, eroded undulating phase	44	450	17	14	1.2	x	18	105
24AL	Paden silt loam, level phase	48	475	18	15	1.3	x	20	110
24BL	Paden silt loam, undulating phase	48	475	19	15	1.4	x	21	115
24BN	Paden silt loam, eroded undulating phase	44	450	17	14	1.2	x	18	105

low, and the soils are strongly to very strongly acid. The Dickson and Paden soils have a "hard pan" layer at 24 to 30 inches. The Mountview soils are underlain by cherty material at 20 to 30 inches.

Suitable uses: These soils are fairly well suited to a wide variety of crops, including corn, wheat, rye, oats, barley, cotton, soybeans, grain sorghum, strawberries, and some vegetable crops; if properly fertilized, they will grow such crops as red clover successfully. All these soils are suited to a mixture of rye and vetch. Most of the soils are somewhat droughty and are therefore better suited to drought-tolerant crops. None of these soils is well suited to alfalfa, but the Mountview soils are better suited than others of the group. Heavy fertilization and liming are required to establish stands of alfalfa or red clover on the soils of this group, but even under the best of management, stands of these crops are difficult to maintain. Sericea lespedeza is a deep-rooted legume that can be grown successfully with moderate fertilization. With heavy fertilization, orchardgrass, fescue, and white and Ladino clovers can be grown successfully.

Management requirements: Row crops can be grown as much as 50 percent of the time, but preferably should never be grown more than two years in succession. A rotation of corn-small grain and lespedeza-small grain-lespedeza is well suited. Most any of the other rowcrops commonly grown, such as cotton, tobacco, or potatoes, can be substituted for the corn in this rotation. Other suitable rotations include (1) corn-wheat-red clover and grass, (2) corn (vetch)-cotton-rye and vetch-vetch, (3) grain sorghum-oats with lespedeza-crimson clover, (4) soybeans-wheat with lespedeza-crimson clover, (5) corn-wheat-sericea (3 years), and (6) cotton (with vetch and rye)-vetch. It is important that a cover crop follow all intertilled crops.

These soils are very deficient in lime, phosphorus, and nitrogen for high yields of most crops, but they vary considerably in the degree of deficiency.* They are also likely to be deficient in potash, especially for the legume crops and cotton. The legume crops if inoculated will generally supply enough nitrogen for moderate yields of the succeeding crop in a rotation, but a complete fertilizer is needed for truck crops and tobacco. Manure is a good source of nitrogen and potash, but should be supplemented with a phosphate fertilizer to obtain a balance of plant nutrients. Nitrogen fertilizer can be used profitably as a topdressing for small grains, cotton, and corn as these soils are very deficient in nitrogen.

* See the county agricultural agent regarding the testing of soils for available plant nutrients and for specific lime and fertilizer recommendations.

Good tilth is easily maintained, and runoff and erosion control should not be serious problems. Contour tillage should be practiced wherever feasible. Terraces or other engineering devices for runoff control should not be necessary.

These soils are physically suited to pasture but are not productive of pasture without liming and fertilization with phosphate. Potash fertilizers may also be required. Another requirement is proper control of grazing. On pastures that receive adequate amendments and are properly grazed, the problem of weed control is not serious but an occasional mowing is necessary. With proper fertilization, a mixture of orchardgrass or fescue and white clover or Ladino can be established and maintained. Sericea is well-adapted to these soils.

Group 6.—Rolling non-cherty yellowish-brown or brownish-yellow soils; not severely eroded; and average expected crop yields under specified management.

	Soil	Corn (bushels)	Cotton (pounds)	Wheat (bushels)	Rye (bushels)	Lespedeza (tons)	Alfalfa (tons)	Soybeans (bushels)	Pasture (cow-acre-days)
48CL	Dickson silt loam, rolling phase	42	425	17	13	1.2	x	18	100
48CN	Dickson silt loam, eroded rolling phase	38	400	16	12	1.0	x	16	90
47CN	Dickson silt loam, eroded rolling dark-surface variant	38	400	16	12	1.0	x	16	90
46CL	Mountview silt loam, rolling shallow phase	38	400	16	15	1.1	2.2	16	100
46CN	Mountview silt loam, eroded rolling shallow phase	34	350	14	16	1.0	2.0	14	90
17CL	Pace silt loam, rolling phase	44	450	17	14	1.2	1.8	18	105
17CN	Pace silt loam, eroded rolling phase	38	360	15	16	1.1	2.2	16	95
24CL	Paden silt loam, rolling phase	44	450	17	14	1.2	x	18	105
24CN	Paden silt loam, eroded rolling phase	40	425	16	14	1.0	x	16	95

The soils of this group are poor to fair crop and pasture lands. They are moderately easy to work but maintenance of a high productivity level and adequate control of erosion are difficult. The soils of the group differ from those of Group 5 chiefly in having stronger slopes — 5 to 12 per cent gradient. This makes them more susceptible to erosion and more difficult to till.

Suitable uses: Soils of this group are suited to a fairly wide variety of crops, including corn, soybeans, wheat, oats, barley, rye, sericea, cotton, tobacco, and many vegetable crops; if properly fertilized, such crops as red clover can be grown successfully. Most of them probably are better suited to the production of small grains or cotton than corn, however. Stands of alfalfa are difficult to maintain. These soils are also fairly well suited to pastures

and with proper fertilization, pasture plants such as orchardgrass, fescue, and white and Ladino clovers are suited.

Management requirements: Row crops can be grown up to one-third of the time but should not be grown in succession. A 3-year rotation of corn-small grain and lespedeza-small grain and lespedeza-crimson clover, or a 4-year rotation of corn-small grain and lespedeza-small grain and lespedeza-small grain and lespedeza-crimson clover, is well suited to these soils. Almost any of the other row crops, as cotton, soybeans, or sorghum, can be substituted for the corn in this rotation. It is important that a cover crop follow all intertilled crops. Vetch or rye and vetch can be planted between rows of corn and cotton for winter cover and green manure. A rotation of corn-wheat-red clover and orchardgrass is well suited if a high level of fertility is maintained. A satisfactory rotation on some farms would consist of corn-small grain-sericea (3 or 4 years).

These soils are deficient in lime, phosphorus, potash, and nitrogen for high yields of most crops, but they vary considerably in degree of deficiency.* Except in favorable seasons, adequate moisture is a problem. The legume crops, if inoculated, will generally supply an adequate amount of nitrogen for moderate yields of the succeeding crop in the rotation. Nitrogen fertilizer as a topdressing for small grains and sidedressing for corn will probably be desirable.

Good tilth is easily maintained and tillage operations can be carried on over a fairly wide range of moisture conditions. These soils are susceptible to erosion, but runoff and erosion control should not be a serious problem if a rotation as suggested above is followed and fertilization is adequate. All tillage should be on the contour and strip-cropping may be advisable on the long slopes. Terraces or other engineering devices for runoff control may be advisable in fields where suitable outlets can be provided. The soils are generally permeable above the hardpan layer, have regular slopes and should be well suited to the use of terraces. A suitable crop rotation, including winter cover crops, should be grown on terraced fields.

To produce high-yielding pastures, moderate to large amounts of lime and phosphate are required. Also, moderate applications of nitrogen and potash fertilizer will likely be needed to establish the pasture stand. Other requirements include proper control of grazing and occasional mowing to aid in the control of weeds. A mixture of white or Ladino clover and orchard grass can be grown with proper fertilization. Sericea can be grown with moderate applications of lime and fertilizer.

* See the county agricultural agent regarding the testing of soils for available plant nutrients and for specific lime and fertilizer recommendations.

Group 7

	Soil	Corn (bushels)	Cotton (pounds)	Wheat (bushels)	Rye (bushels)	Lespedeza (tons)	Alfalfa (tons)	Soybeans (bushels)	Pasture (cow-acre-days)
136CL	Baxter cherty silt loam, rolling light-surface phase	32	335	14	14	.9	2.0	10	85
136CN	Baxter cherty silt loam, eroded rolling light-surface phase	29	300	12	12	.8	1.8	10	75
136BL	Baxter cherty silt loam, undulating light-surface phase	35	360	15	14	1.0	2.2	12	95
136BN	Baxter cherty silt loam, eroded undulating light-surface phase	32	335	14	14	.9	2.0	10	85
38CL	Bodine cherty silt loam, rolling phase	28	275	12	12	.8	x	x	55
38CN	Bodine cherty silt loam, eroded rolling phase	25	250	10	12	.7	x	x	50
38BL	Bodine cherty silt loam, undulating phase	30	300	13	13	.8	x	x	60
38BN	Bodine cherty silt loam, eroded undulating phase	28	275	12	12	.8	x	x	55
138CL	Bodine fine cherty silt loam, rolling phase	32	325	13	13	.9	x	x	70
138CN	Bodine fine cherty silt loam, eroded rolling phase	28	290	11	11	.8	x	x	60
138BL	Bodine fine cherty silt loam, undulating phase	35	350	14	14	1.0	x	x	85
138BN	Bodine fine cherty silt loam, eroded undulating phase	32	325	13	13	.9	x	x	70
16BL	Pace cherty silt loam, undulating phase	40	325	16	14	1.2	2.4	16	110
16BN	Pace cherty silt loam, eroded undulating phase	38	300	14	16	1.1	2.2	14	100
16CL	Pace cherty silt loam, rolling phase	38	300	14	16	1.1	2.2	14	100
16CN	Pace cherty silt loam, eroded rolling phase	36	275	12	13	.9	x	x	80
37CL	Sulphura cherty silt loam, rolling phase	x	250	x	x	.7	x	x	50
37CN	Sulphura cherty silt loam, eroded rolling phase	x	250	x	x	.7	x	x	50

Group 7.—Rolling and undulating cherty yellowish-red to brownish-yellow soils and average expected crop yields under specific management.

The soils of this group are poor to fair crop and pasture soils. All are cherty and most areas occupy 5 to 12 percent slopes. The amount and size of the chert fragments are sufficient to hinder cultivation and mowing on some areas. The soils are moderately easy to till. All are moderately low to low in plant nutrients, organic matter, and water-supplying capacity and are acid in reaction. Most areas of these soils are on narrow winding ridge crests associated chiefly with soils not suited for cultivation. Access to many of these areas is difficult.

Suitable uses: Although physically fairly well suited for crop production, the manner of occurrence makes it impractical to cultivate these soils in many places. Chertiness, low fertility, and low water-supplying capacity further lowers their desirability for crop production. Corn, tobacco, cotton, soybeans, rye, wheat, oats, and many legume and grass crops can be grown with fair success under a high level of management. Red clover is not very well suited but can be grown with adequate fertilization. Orchardgrass, fescue, and white and Ladino clovers are pasture plants that will succeed at high levels of fertility; lespedeza and redtop are better adapted at average fertility levels.

Management requirements: The use of row crops up to one-third of the time is feasible, but a row crop should not follow a row crop. Suitable rotations include (1) corn-wheat-red-clover and orchardgrass, (2) lespedeza-small grain, (3) corn or cotton (wheat or rye)-lespedeza-small grain-lespedeza (vetch or crimson clover), and (4) corn (wheat)-sericea (3 or 4 years).

These soils are deficient in nitrogen, phosphate and potash for most crops.* Liming is necessary to obtain and maintain stands of the more desirable legume crops, as red clover and Ladino. A good legume crop will supply much of the nitrogen needed for other crops in the rotation, especially the one immediately following the legume. Additional nitrogen may be needed for high yields of corn and other grain crops. Practically all crops respond well to the use of phosphate. Potash fertilizer is generally needed for cotton, tobacco, and legume crops or other crops following a high-yielding hay crop.

Soils of this group are not as erosive as those of Group 6, and if management is good otherwise, terraces should not be necessary. However, contour tillage is advisable wherever feasible. The soils are permeable and terraces should be easily maintained if needed. Chertiness interferes with tillage and will influence the choice of crops. Usually crops should be grown that require a minimum of hand tillage that do not require harvesting with a

combine. Removal of chert would greatly improve the ease of tillage but is not practical except on small truck patches.

These soils may be better used for pasture than for cropping on many farms, especially where the areas are small and associated with hilly and steep soils. Fair pastures can be established and maintained, but they will need substantial applications of lime and phosphate. Potash and nitrogen may also be needed in establishing the pasture. Fescue, orchard grass, white clover, Ladino clover, and lespedeza are adapted to these soils. Control of grazing is very important, particularly in dry seasons to avoid injury to the pasture stand. Mowing is desirable for control of weeds, but may be difficult because of the chertiness of the soils.

Group 8.—Nearly level to undulating imperfectly drained yellow soils and average expected crop yields under specific management.

	Soil	Corn (bushels)	Cotton (pounds)	Wheat (bushels)	Rye (bushels	Lespedeza (tons)	Alfalfa (tons)	Soybeans (bushels)	Pasture (cow-acre-days)
50AL	Lawrence silt loam, level phase	36	250	12	15	1.0	x	16	75
50BL	Lawrence silt loam, undulating phase	32	275	13	15	1.0	x	16	95
50BN	Lawrence silt loam, eroded undulating phase	32	275	13	15	1.0	x	16	75
4H	Pembroke silt loam, imperfectly drained variant	44	400	16	14	1.5	x	28	145
49AL	Sango silt loam, level phase	40	300	13	15	1.1	x	18	90
49BL	Sango silt loam, undulating phase	40	325	16	15	1.2	x	19	100
49BN	Sango silt loam, eroded undulating phase	36	300	15	15	1.1	x	18	90
26	Taft silt loam	38	300	15	16	1.0	x	18	95

The soils of this group are poor to fair crop and pasture lands. They are very easy to till at the proper moisture level, but they are slowly drained and are too wet to till much of the time during the spring season. Artificial drainage would broaden the range of use suitability and increase average crop yields. In general, these soils are even more acid and deficient in plant nutrients than those of Group 6.

Suitable uses: Imperfect drainage, low fertility, and low water-supplying capacity limit the suitability of these soils for crops that require tillage. They are probably better suited for pasture although they are low in productivity of most pasture plants. In their present drainage condition, summer annual crops, as sorghum, soybeans, and lespedeza and the perennial crop sericea are grown successfully on them; but yields are very low unless they are fertilized. With adequate fertilization, they would be well suited to such pasture plants as fescue and alsike, white, and Ladino clovers. Artificial drainage would broaden their use suitability; with drainage and adequate fertilization and liming, they

would be suited to cotton, tobacco, wheat, oats, rye, vetch, and red clover.

Management requirements: Good management of these soils consists chiefly of selection of crops that are suited to alternate wet and dry conditions, supplying needed amendments, and improving drainage, thereby broadening the use suitability. The following are examples of suitable rotations after drainage: (1) grain sorghum-small grain-sericea (3 years), (2) cotton (wheat)-lespedeza-small grain-lespedeza-crimson clover (3) soybeans-rye and vetch and (4) grain sorghum-oats[1] with crimson clover or vetch. Where the demand for row crops is great, row crops can be grown successfully in alternate years if the soils are carefully managed in other respects.

In general, these soils are very deficient in lime, phosphorus, potash, and nitrogen.* Cotton and small grains need complete fertilizers. Legumes and legume-grass mixtures for hay or pasture need phosphorus and potash but not nitrogen if properly inoculated. Lime is essential to success with most legumes, and all crops in the rotation will be benefited by its use.

Tillage operations may be delayed in the spring months because of unfavorable moisture conditions. Drainage of these soils can usually be improved by the use of open ditches, bedding, or diversion ditches. Tile would not be expected to be effective because of the hardpan layer.

These soils are fairly well suited to pasture lands, but are too droughty to sustain good grazing during dry spells in the summer and fall seasons. Liming and complete fertilization are necessary for establishing good pastures. A mixture of white clover and fescue is best for high production; red top and lespedeza if the soil is not heavily fertilized. Periodic clipping to control weeds is advisable.

Group 9. — Nearly level to depressional poorly drained gray soils and average expected crop yields under specified management.

Soil	Corn (bushels)	Cotton (pounds)	Wheat (bushels)	Rye (bushels)	Lespedeza (tons)	Alfalfa (tons)	Soybeans (bushels)	Pasture (cow-acre-days)
Guthrie silt loam	23	x	x	x	.8	x	12	65
Lee silt loam	30	x	x	x	1.0	x	14	100
Robertsville silt loam	25	x	x	x	.9	x	13	75
Lee silt loam, local alluvium phase	37	x	x	x	1.1	x	17	110

[1] Drilled in middle before grain sorghum is harvested.

* See the county agricultural agent regarding the testing of soils for available plant nutrients and for specific lime and fertilizer recommendations.

The soils of this group are poorly suited to crops; but are fair to good pasture soils. All are poorly drained and subject to flooding or ponding of water for variable periods. They are low or very low in fertility, especially in content of potash, and strongly to very strongly acid. Most areas of Robertsville and Guthrie soils have a hardpan layer at fifteen to twenty-five inches, and this hardpan interferes with root penetration and water movement. The Lee soils are generally more fertile than the others, but they vary in fertility and reaction.

Suitable uses: Under natural drainage conditions, these soils are considered to be poorly suited to the production of crops requiring tillage, but suitable for pasture although the Robertsville and Guthrie soils are very low in productivity of pasture plants. If the soils are properly fertilized, white clover and fescue will grow satisfactorily; but at lower fertility levels, lespedeza and redtop are better suited. All would be improved by artificial drainage; and, if adequately drained, would be suitable for the production of such crops as soybeans, sorghum, and sericea. Draining of the Robertsville and Guthrie soils is difficult and is of doubtful practicability because of the hardpan layer.

Management requirements: The first step in pasture improvement should probably be directed toward improving moisture conditions. Drainage can be improved considerably in most places through the use of open ditches, bedding, and diversions; also, tile would probably be helpful on the Lee soils. After drainage has been improved, fescue and white clover or lespedeza can be expected to do fairly well if lime, phosphate, and potash are used.* Mowing will aid in weed control.

Although considered poorly suited to crops requiring tillage, these soils may be fairly well suited to soybeans and sorghum which can be planted in late spring or early summer and harvested in the fall. Potash levels in these soils are lower than in the better-drained soils, and this should be considered in planning the fertilization program.

Many areas of these soils are in bottom land hardwood forest at the present time, which is probably the best use on most farms. Before clearing such areas, the farmer should consider the limited possibilities for crop or pasture production and the costs involved in clearing and building up the fertility level.

Group 10.—Severely eroded rolling yellowish-brown and brownish-yellow soils; hilly and eroded hilly yellowish-brown soils; hilly and steep red soils, and average expected crop yields under specified management.

This group includes soils poor for cropland and poor to good for pasture land. Owing to erosion injury, extreme susceptibility to further erosion, strong slopes, low fertility, or stoniness, or

Group 10

	Soil	Corn (bushels)	Cotton (pounds)	Wheat (bushels)	Rye (bushels)	Lespedeza (tons)	Alfalfa (tons)	Soybeans (bushels)	Pasture (cow-acre-days)
132DL	Ashburn cherty silt loam, hilly phase	38	375	x	x	1.1	2.7	x	105
36DL	Baxter cherty silt loam, hilly phase	30	250	x	x	.9	1.9	x	85
36DN	Baxter cherty silt loam, eroded hilly phase	28	225	x	x	.8	1.7	x	75
36DP	Baxter cherty silty clay loam, severely eroded hilly phase	x	x	x	x	.5	x	x	55
36EL	Baxter cherty silt loam, steep phase	x	x	x	x	x	x	x	75
36EN	Baxter cherty silt loam, eroded steep phase	x	x	x	x	x	x	x	70
136DL	Baxter cherty silt loam, hilly light-surface phase	25	230	x	x	.7	1.6	x	65
136DN	Baxter cherty silt loam, eroded hilly light-surface phase	22	210	x	x	.6	1.5	x	50
136CP	Baxter cherty silty clay loam, severely eroded rolling light-surface phase	x	220	x	x	.6	1.4	x	50
38DL	Bodine cherty silt loam, hilly phase	x	x	x	x	.7	x	x	50
38DN	Bodine cherty silt loam, eroded hilly phase	x	x	x	x	.6	x	x	40
38CP	Bodine cherty silt loam, severely eroded rolling phase	15	150	x	x	.5	x	x	35
138DL	Bodine fine cherty silt loam, hilly phase	x	x	x	x	.7	x	x	50
138DN	Bodine fine cherty silt loam, eroded hilly phase	x	x	x	x	.6	x	x	40
138CP	Bodine fine cherty silt loam, severely eroded rolling phase	17	200	x	x	.5	x	x	40
48CP	Dickson silty clay loam, severely eroded rolling phase	20	250	x	x	.5	x	x	45
47CP	Dickson silty clay loam, severely eroded rolling dark-surface variant	20	250	x	x	.5	x	x	45
18DL	Minvale cherty silt loam, hilly phase	30	325	x	x	.9	1.9	x	95
18DN	Minvale cherty silt loam, eroded hilly phase	26	270	x	x	.8	1.7	x	85
18DP	Minvale cherty silty clay loam, severely eroded hilly phase	x	x	x	x	.5	x	x	65
46CP	Mountview silty clay loam, severely eroded rolling shallow phase	20	250	x	12	.6	x	x	60
16CP	Pace cherty silty clay loam, severely eroded rolling phase	22	175	x	x	.6	x	x	45
16DL	Pace cherty silt loam, hilly phase	x	x	x	x	.7	x	x	55
16DN	Pace cherty silt loam, eroded hilly phase	x	x	x	x	.6	x	x	45
24CP	Paden silty clay loam, severely eroded rolling phase	22	275	x	x	.6	x	x	50
37DL	Sulphura cherty silt loam, hilly phase	x	x	x	x	.7	x	x	55
37DN	Sulphura cherty silt loam, eroded hilly phase	x	x	x	x	.6	x	x	50
37CP	Sulphura cherty silt loam, severely eroded rolling phase	x	x	x	x	.5	x	x	35

some combination of these defects, these soils are poorly suited for crop production. They vary greatly in their suitability for pasture, but it is thought that pastures can be established and maintained under a high level of management. All are deficient in lime and the major plant nutrients, but they vary greatly in their deficiencies. The water-supplying capacity is low or very low.

Suitable uses: These soils are not well suited for the production of intertilled crops. Semi-permanent hay crops and pasture also produce low yields, but in their present condition the soils of this group are probably better suited to these uses. Hay and pasture plants, as sericea, orchardgrass, fescue, white and Ladino clovers, lespedeza, redtop, and Bermuda grass are adapted. A wide variety of intertilled crops can be grown but are generally not recommended except in long rotations because of the difficulty of conserving the soils when cultivated. Many areas might best be used for woodlands or forestry, and some areas of these soils now in trees probably should not be cleared.

Management requirements: The management requirements of these soils are very exacting for the successful growth of crops. On most farms these soils are probably best used for semi-permanent hay crops or pasture. To maintain or increase the productivity, a long rotation consisting chiefly of close-growing crops with proper and adequate fertilization is required. If other management practices are good, a row crop can probably be grown once in five or six years. It is especially important that a cover crop, preferably including a legume, follow the intertilled crop. Where the soils are kept in sod crops most of the time, erosion is held to a minimum, soil moisture is conserved, and the supplies of nitrogen and humus are increased or maintained.

These soils are low in nitrogen, phosphorus, potash, and lime. Small grains and grass crops require complete fertilizers for adequate yields. Legumes or legume grass mixtures require soil treatments of phosphorus and potash but no nitrogen if the legumes are properly inoculated. Lime is necessary to secure good stands of legumes, and it also improves the yield and quality of other crops in the rotation.* As on other soils, barnyard manure in adequate quantities is an excellent source of nitrogen, potash, and organic matter.

Contour tillage should be practiced wherever feasible and strip-cropping may be advisable if row crops are to be grown more frequently than every fifth or sixth year. Terraces can be used satisfactorily on the rolling phases of the group provided suitable outlets are available.

* See the county agricultural agent regarding the testing of soils for available plant nutrients and for specific lime and fertilizer recommendations.

Applications of lime and complete fertilizers are essential in establishing permanent pasture. A mixture of orchard grass or fescue and white or Ladino clover can be established and maintained with proper fertilization. Following the establishment of a pasture, applications of lime, phosphate, and possibly potash at intervals are necessary to maintain a good stand. Weed control is difficult on the stony and cherty soils owing to the difficulty of using mowing machines. (See page 41 for a more complete discussion of pasture management.)

After a few years in a well-managed pasture, the severely eroded rolling soils may again be suited to crops provided an effective water-control system has been established. If so, the management practices would be similar to those of Group 6.

Group 11.—Severely eroded hilly yellowish-brown soils, steep soils; and miscellaneous land types; and expected pasture yields under specified management.[2]

	Soil	Pasture (cow-acre-days)
36EP	Baxter cherty silty clay loam, severely eroded steep phase	50
136EL	Baxter cherty silt loam, steep light-surface phase	40
136EN	Baxter cherty silt loam, eroded steep light-surface phase	35
136EP	Baxter cherty silty clay loam, severely eroded steep light-surface phase	x
136DP	Baxter cherty silty clay loam, severely eroded hilly light-surface phase	40
38EL	Bodine cherty silt loam, steep phase	40
38EN	Bodine cherty silt loam, eroded steep phase	35
38EP	Bodine cherty silt loam, severely eroded steep phase	x
38DP	Bodine cherty silt loam, severely eroded hilly phase	30
138EL	Bodine fine cherty silt loam, steep phase	40
138EN	Bodine fine cherty silt loam, eroded steep phase	35
138EP	Bodine fine cherty silt loam, severely eroded steep phase	x
138DP	Bodine fine cherty silt loam, severely eroded hilly phase	30
72	Mines, pits, and dumps	x
16DP	Pace cherty silty clay loam, severely eroded hilly phase	x
R	Riverwash	x
78E	Rockland, limestone or shale material	x
74	Stony hilly land, Bodine soil material	x
75	Stony steep land, Bodine soil material	x
37EL	Sulphura cherty silt loam, steep phase	45
37EN	Sulphura cherty silt loam, eroded steep phase	40
37EP	Sulphura cherty silt loam, severely eroded steep phase	x
37DP	Sulphura cherty silt loam, severely eroded hilly phase	30

The soils of this group have some characteristics such as stoniness, steep slopes, very low fertility, or very low water-supplying capacity, which largely preclude their use for either crop or pasture. This group includes the steepest soils of the county with slopes ranging from 25 to 60 per cent or more. Numerous chert fragments occur on the surface and throughout the subsoils of

[2] Crop yield data are not given as all of these soils are very poorly suited to the production of crops.

most of these soils. Bedrock outcrops and nearly vertical bluffs of cherty limestone occur along some of the valley slopes. The soils are low in organic matter, deficient in plant nutrients, and are strongly acid. Surface runoff is very high, and rainfall absorption and retention by the soils are low.

Use suitability and management requirements. — The greater part of these soils is in forest at present, and in general, a program of reforestation should be carried out on the remaining acreage.

Although these soils are not physically suited for crops and pasture, it is true that economic and social factors, both inside and outside the farm boundary, have a bearing on their use for crops and pasture. Where the production of tilled crops is attempted, adequate liming and fertilizing, and every reasonable supporting practice for water control are needed. The use of amendments and careful selection and rotation of crops are especially needed to encourage heavy vegetation.

For the maintenance of pastures, additions of lime and fertilizers, particularly phosphorus, and other good management practices are required. In general, legumes should make up a considerable part of the pasture sod. It is difficult to apply materials and also to control weeds in many places, chiefly because of steep slopes, stoniness, and inaccessibility.

On some of the cleared areas of these soils, a suitable forest cover will establish itself if the areas are properly protected against fire and grazing by livestock. Generally speaking, however, the severely eroded hilly and steep soils can be reclaimed most economically by planting them to forest. Tree seedlings are provided without cost by the Tennessee Valley Authority.

It is of first importance to select species that will grow well on the sites to be planted. Although farmers many times prefer locust because of their farm needs for fence posts, pine is almost always better adapted to the severe growing conditions characteristic of most lands designated for use as forest. Loblolly pine can be depended upon to revegetate these soils quickly and minimize soil erosion losses. Wherever there is any surface soil remaining, the loblolly pine should respond with a rapid initial growth. On the least favorable of these sites, particularly on south and west exposures, preference would be given to shortleaf pine or even Virginia pine. Black locust can be grown successfully in the well-drained well-areated material behind check dams on many soils. Yellow poplar has limited use in ravines and on northern and eastern exposures, in deep, well-drained colluvial material.

For a discussion of forest management practices, see page 42.

SOME GENERAL PRINCIPLES OF SOIL MANAGEMENT

Soil management refers to the way in which the soil is handled in the production of cultivated crops, pasture, and forest. A good system of soil management will give high yields and reduce erosion losses and thus contribute to soil conservation. The importance of soil conservation to the individual farmer, to the community, and to the nation is now well recognized by nearly everyone.

Great differences among the soils in such properties as slope, color, depth to rock, fertility, and stoniness, result in differences in their crop adaptation and management needs. Each farm has its own soil pattern and therefore its own management problems; however, some principles of soil management are general enough to apply to all farms. Other soil-management procedures apply only to specific soils and certain crops. This section of the report presents the general principles of management which may be applied widely. The specific management problems of certain soil groups are discussed in greater detail in the previous section on soil management groups, pages 5 to 26.

The general procedure in developing a good soil-management program for a farm is about as follows:

1. Select a cropping system that is suited to the soils on the farm.

2. Add the soil amendments needed by the soils for the crops that are to be grown. The soil amendments include lime, fertilizers, farm manures, crop residues, and cover crops grown for green manuring. Soil tests are helpful in determining lime and fertilizer needs.

3. Use good tillage practices to prepare a good seedbed for planting and to aid in weed control.

4. Practice contour farming and install terraces where necessary to reduce erosion on cultivated land.

5. Install necessary drainage where it is likely to be profitable.

6. Practice irrigation where possible and profitable.

Each of these major topics is discussed separately.

Crop Selection

Under most soil conditions higher yields can be obtained when crops are grown in a good rotation. Crop rotation aids in the control of insects, diseases, and weeds, in the maintenance of organic

matter and of good soil condition or tilth, in the efficiency of soil fertility utilization, and in the control of runoff water.

A crop rotation is the growing of two or more different crops in a definite order or sequence. The combination of crops in a good rotation usually should include a legume for nitrogen, a cultivated crop to aid in weed control, a deep-rooted crop to utilize subsoil fertility and maintain subsoil permeability, a close-growing or sod crop to help maintain the organic-matter supply of the soil and good mellow surface soil conditions.

It is not necessary that four different crops be included in a rotation, nor is it necessary that a rotation be limited only to four crops or less. For example, the legume crop might also be a deep-rooted crop; furthermore, a grass might be seeded with a legume crop and thus form a close-growing grass-legume sod. The cultivated crop might be corn, or more than one cultivated crop might be used in the same rotation, such as corn one year and cotton another.

In a good rotation the sequence of crops should be such that the soil is covered as much of the year as possible. This is particularly important on sloping lands where erosion might occur.

Soils vary greatly in the frequency with which a cultivated crop or a crop which requires seedbed preparation should be grown. In general, soils more subject to damage by runoff water require longer periods in sod or close-growing crops and less frequent use for row crops. Soils which are mellow, deep, permeable and nearly level are suited to the frequent production of cultivated crops. Soils with less favorable properties, such as heavy clay subsoils which drain slowly, sloping topography which increases the erosion hazard, or easily compacted surface layers which crust readily when cultivated, should be kept in sod and close-growing crops a larger proportion of the time. Should soil properties be particularly unfavorable, then the land may best be suited to permanent pasture, or in extreme cases, to woodland and forest. Details for specific soils are discussed in the previous section on Soil Management Groups.

Certain so-called "deep rooted" crops, such as alfalfa and sericea, can develop deep-root systems under favorable soil conditions. However, when soil conditions are unfavorable, the root systems may be very shallow; for example, a hardpan layer in the soil may prevent the penetration of alfalfa or sericea roots as well as corn roots. On the other hand, deep permeable well-drained soils permit alfalfa, sericea, and corn roots to penetrate much more deeply. This is one of the reasons why alfalfa, particularly, does much better on certain soils that are deep and permeable than on other soils which are poorly drained or shallow. Sericea

will do relatively well, however, on "hardpan" soils where alfalfa does not thrive.

Soil adaptations of specific crops important in Lawrence County are as follows:

Alfalfa—This is a deep-rooted crop that has a long growing season and produces a large total yield on adapted fertile soils. It needs a continuous large supply of moisture, part of which may be obtained from the subsoil in dry periods if root penetration is deep. At the same time, the soil must be well-drained so that plenty of air is available to the plant roots. Prompt removal of excess moisture in the winter will avoid heaving by frost action. Alfalfa stands will persist longer on soils having a firm subsoil than on those having a loose open subsoil.

Corn—This is a moderately deep-rooted crop that makes its total growth in the short period of the hot summer months. It needs a large supply of water during this short period. Easy permeability of surface and subsoil is desirable to permit the rapid root penetration necessary to use the deeper moisture reserves at the critical time when they are needed. Being a clean-cultivated crop, the erosion hazard may be serious even on moderate slopes.

Cotton—Compared to corn, cotton has a relatively shallow root system, a moderately long growing season, and produces only a moderate total yield. As a consequence, it has only medium water requirements. A mellow seedbed is important to assure germination and seedling establishment. As a general rule, cotton will produce high yields on most soils adapted to corn if they are not too wet to prevent early planting. Also cotton will make satisfactory yields on some soils too dry for corn.

Tobacco—Tobacco requires adequate drainage and aeration of the surface soil. Like cotton, it is more drought tolerant than corn, and its total yield is less than that of corn. Therefore, its water requirement is only moderate. Heavy fertilization and the moderate water requirement permit high yields with only medium depth of root penetration. As with all cultivated crops, the erosion hazard may be serious on even moderate slopes.

Soybeans—Soybeans are comparatively shallow rooted and even more drought resistant than tobacco or cotton. The growing season necessary to produce a hay crop is moderately short and even a seed crop will mature in less time than is required by corn. Therefore, soybeans may often be grown on land that is too wet for early planting of corn or cotton. A mellow seedbed is important so that the seedlings can come up. A hard or crusted sur-

face often causes the bean necks to break, reducing the stand. Even when drilled, soybeans may permit as much or even more erosion than row crops because soybeans leave the soil very loose. Therefore, they should be grown on relatively level soil areas insofar as possible.

Small grains—Only winter-hardy varieties of small grains are recommended for Tennessee. The season during which these small grains make their vegetative growth is usually cool with frequent rains so that an adequate supply of moisture is present in the surface soil. Thus deep root penetration to utilize the subsoil moisture is not an important factor in their success. Furthermore, since these are close-seeded crops, they are more effective than row crops in preventing erosion on slopes. The small grains are adapted to a rather wide range of soil conditions. Barley requires the highest level of soil fertility, wheat next, then oats and finally rye. Barley is also very sensitive to poor drainage, while oats is the most tolerant of wet conditions. Wheat is particularly responsive to phosphate fertilization, but yields are often limited by leaf and stem rusts. Rye is the most winter hardy and oats the least.

White clover and Ladino clover—An outstanding characteristic of white clover is its preference for a large supply of moisture in the surface soil. It will flourish on many soils that are too wet for any cultivated crop, provided the fertility level is adequate. Because of its shallow rooting habit under conditions of high surface moisture, the presence of hardpans and claypans in the soil often is of little importance. White clover does not do so well on shallow, sloping soils, especially if they also contain hardpans or claypans. Bottom lands are excellent for white clover because the water supply in them is usually high throughout the year.

Sweet clover—Sweet clover has the highest lime requirement of any legume grown in Tennessee, requiring a pH of 6.5 or above. With adequate lime, however, it will grow on nearly all land suitable for any of the small grains.

Vetch—Lawrence County is one of the leading areas in Tennessee in the production of vetch. Vetch can be seeded later than some of the other winter legumes with a reasonable assurance of obtaining a stand; therefore, it fits in well as a cover crop, particularly after cotton. Vetch has a wide adaptation from the point of view of soil requirements and will grow on nearly all land that is suitable for small grain. One of the most popular combinations for a winter cover crop in Lawrence County is rye and vetch. Not only is vetch adapted to a wide variety of soils, but it will tolerate a considerable range in fertility and still make satisfactory growth.

Like most crops, however, it does better on moderately well-drained soils which are well supplied with lime and fertilizer.

Crimson clover—Another winter annual legume which has a wide adaptation to a variety of soil conditions is crimson clover. In general, it must be seeded moderately early for adequate growth. Crimson clover will tolerate relatively low levels of fertility but grows much better with adequate amounts of lime and fertilizer.

Buttonclover—This is a winter annual legume which requires relatively well-drained soils for satisfactory production. It also has relatively high lime and fertilizer requirements. One big advantage of buttonclover over crimson clover is the fact that it produces hard seed, and once a seed crop is allowed to mature, it will volunteer for several succeeding years on cultivated land. Its successful production, however, is limited to the more fertile and to the better-drained soils, such as those adapted to alfalfa, on which a row crop may be produced nearly every year.

Red Clover—Red Clover will grow on many soils that are not well enough drained for the successful production of alfalfa. This includes many of the soils, such as Dickson, which are underlain by a hardpan layer. Red clover also has a somewhat lower lime and fertilizer requirement than alfalfa and will grow on soils which are slightly to moderately acid. Because of its wider adaptation, red clover can be grown successfully on a rather wide variety of soils in Lawrence County. It is important to plant the disease resistant varieties to get the best yields.

Grain Sorghum—Because grain sorghums can be planted rather late in the season and still mature, they are adapted to certain soils which are too wet for the successful production of cotton, or even corn; furthermore, grain sorghums will withstand rather long dry spells without serious injury. On this account, grain sorghums can be grown on such soils as Dickson and Lawrence which are underlain by a hardpan.

Sericea—This legume will grow on many soils where alfalfa is not suited. Because sericea is a long-lived plant and develops a vigorous root system, it is worth consideration on soils where alfalfa may not be well suited. Such situations include soils underlain by hardpans or which are otherwise unfavorable for alfalfa. Sericea will grow at relatively low fertility levels on moderately acid soils, but good yields and rapid growth are obtained only where adequate amounts of lime and fertilizer are used.

Soil Tillage

The two major purposes of tillage are to prepare a seedbed for planting and to control weeds after planting. Certain insects and disease may be controlled sometimes by plowing under crop residues. This, however, is usually done in connection with the preparation of the seedbed for planting. Sometimes fertilizers and lime are mixed in the soil or properly placed near the row in connection with a cultivation or seedbed preparation. Attempts to reduce the evaporation of moisture by cultivation are largely useless; however, cultivation kills weeds which would take moisture from the soil. Sometimes it is desirable to break the surface crust in a cultivated field after a heavy rain in order to permit the moisture from the next rain to penetrate more readily, even though weeds are not troublesome at that time. Soil cultivation on sloping land increases the erosion hazard, but proper methods cause less erosion than improper ones.

Seedbed preparation usually involves turning of the soil with a plow followed by discing, harrowing, or other clod-breaking operations. Any rules that might be suggested for the proper turning or plowing of the soil will have many exceptions; yet it seems desirable to offer a few suggestions about plowing.

There has been much argument about the proper depth to plow soils. A moderate depth of plowing, say 6 or 8 inches, is just as satisfactory as deeper plowing. Usually it is desirable to plow somewhat deeper for crops like alfalfa and Irish potatoes than it would be for shallow-rooted crops such as the small grains. Sandy soils usually may be plowed more deeply than clay soils for best results.

In some soils which are plowed frequently to the same depth, a compacted layer often develops just below the plow depth. This is often spoken of as plow "pan" or plow "sole". The development of this compacted layer can be avoided by plowing less frequently and growing more sod crops, or by changing the depth of plowing slightly from one time to another.

Some farmers do not "turn" the land but use a disc plow or "duck-foot" to stir the surface layer and to leave the crop residues on top to protect the surface from the beating of rain and subsequent erosion. The desirability of this practice under Tennessee conditions has not been definitely established. In most cases, it would seem to be less desirable than the usual method, particularly where insects and diseases can be controlled in part by covering the crop residues.

After the soil is plowed, the cultipacker is helpful in getting a firm seedbed particularly for small seedbed plants like the pasture grasses and legumes.

Since sloping areas are more subject to erosion when they are bare of vegetation, it is desirable to plant them as soon after plowing as possible. Unfavorable weather conditions, particularly excess rain in the spring, sometimes make it difficult to plow on schedule, hence farmers oftentimes plow during the winter — a considerable period in advance of the expected planting date. When heavy rains follow winter plowing of slopes, erosion often becomes serious.

In cultivating row crops for the control of weeds, the important points to remember are that the weeds are most easily killed while they are small and that injury to the roots of the crops should be avoided. The first cultivation of corn or tobacco can be fairly deep if desired without danger of injury to roots. Later cultivations should be as shallow as possible—just deep enough to kill the weeds and yet not injure too much the roots of the crop which in the case of corn particularly, may extend well across the row. Some of the newer cultivators have blades which go only to a shallow depth instead of the old style shovels or discs. If there are no weeds in the row crop, usually there is no particular need to cultivate most soils. Once corn is waist high, it should not be cultivated any more since the benefits from control of the weeds will probably be less than the injury resulting from the cutting of the roots. A good seedbed with proper fertilization will permit the corn to compete with the weeds successfully once it reaches this stage of growth.

The Use of Soil Amendments

The purpose of adding fertilizers and other amendments to the soil is to increase crop yields or make it possible to grow crops that could not be grown otherwise. Most Tennessee soils are naturally acid, low in organic matter, available nitrogen and phosphorus, and medium to low in available potassium. A sound program of soil treatment will usually involve the addition of lime, fertilizer, and organic matter on most fields.

Soils vary in acidity and content of organic matter and available plant nutrients, and if a given soil is well supplied with potash, say, it is not desirable to add large amounts of additional potash. Proper use of amendments, then, is not only concerned with supplying adequate amounts but in obtaining a proper balance among the available nutrients.

One of the best ways to get an estimate of the available plant nutrients in a soil is to take samples and have them tested. The laboratory which does the testing will also make fertilizer and lime recommendations for the particular crop or crop rotation which is to be grown in the field from which the sample came. See your county agent for directions in collecting soil samples.

Lime—It usually is recommended that lime be the first soil amendment used. Lime increases the benefits obtained from commercial fertilizers and from farm manures; furthermore, lime is a relatively inexpensive material as compared to commercial fertilizers. The organic-matter content of the soil may be maintained more easily by the growth of legumes after the use of lime. After liming, additional fertilizer may be needed to maintain high crop yields. For example, yields of cotton may be reduced after liming soils low in potash unless adequate potash fertilizer is used.

In order to determine the correct amount of lime to use, it is desirable to take samples of soil from the field to be treated and have them tested. For most Tennessee soils one to three tons of finely ground limestone is an adequate initial application. Lime may be applied at any convenient time during the year, but it is preferable to get it on the land and mixed in the soil three to six months or more ahead of such legumes as alfalfa. The liming materials should be broadcast uniformly over the field and mixed with the surface few inches of soil. The mixing may be done by discing before the land is plowed, or the liming material may be spread on plowed land and mixed in by discing. On permanent pastures it is not possible to mix the lime in the soil and in this case a uniform broadcasting on the surface is all that can be done. Lime dissolves slowly on the surface of the soil and response of permanent pastures to a surface application of lime may be somewhat slower than if the lime were mixed with the soil before the pasture was seeded.

Tennessee soils do not need to be relimed very frequently. The rate at which lime leaches from a well-limed soil is estimated at two to four hundred pounds per acre per year. Thus as much as one ton of lime might be lost by leaching in the course of five or ten years. Before reliming the field, it is desirable to take soil samples again and have them tested for acidity. Soils which have received too much lime may not produce as satisfactory crops as they would with the correct amount.

Commercial fertilizers—The major plant nutrients[3] supplied by commercial fertilizers are nitrogen, phosphate, and potash. These may be purchased in separate materials such as ammonium nitrate, superphosphate, and nitrate of potash; or they may be purchased in mixtures. Commercial fertilizers are usually sold in 100-pound bags which carry percentage figures of nitrogen, phosphate, and potash printed on the outside of the bag. A 6-12-12 fertilizer for example, contains 6 percent nitrogen, 12 percent phosphate, and 12 percent potash.

In general, it is more economical to purchase the fertilizers of higher concentration, although the price per ton is higher. For

[3] Often called "plant foods".

example, 400 pounds of a 6-12-12 would contain as much "plant food" as 600 pounds of 4-8-8. The cost of bagging and freight and the labor in handling the material is less for the 400 pounds of 6-12-12 than for the 600 pounds of 4-8-8.

Usually the best time to apply mixed fertilizers is when the crop is being planted or just a short time ahead of planting. For row crops moderate amounts of fertilizer may be put in the row with the seed or placed in bands beside and a little deeper than the seed. If larger amounts of fertilizer are added in the row, there is danger of injuring the seed. It is better to apply no more than about 200 pounds per acre in the row, and either broadcast the rest or put it in bands two or three inches to the side of the seed and two or three inches below the seed level.

Nitrogen in the form of nitrate is readily leached from the soil in wet weather; therefore, it should be applied only when the crop is ready to use it. A small amount can be put in at seeding time and the rest applied as a side dressing when the crop is growing vigorously. For cotton, the extra nitrogen is usually applied after chopping, and for corn at either the first or second cultivation.

Ammonia forms of nitrogen are not so readily leached from the soil and larger amounts may be put on at planting time if it is convenient to do so. In the case of cotton, however, large applications of nitrogen at planting may encourage weed growth and make chopping more difficult.

Pasture and hay crops are usually fertilized at seeding time, but they need additional top dressings in the following years if yields are to remain high. If phosphate alone is needed to maintain yields, it might be applied as a top dressing in the fall or winter every other year. If both phosphate and potash are needed, however, it is preferable to make applications every year in the fall, winter or early spring. Potash does not leach from the soil rapidly, but if present in larger amounts than necessary for the best plant growth, most plants will absorb larger amounts of potash than they actually need.

The amounts of fertilizer to apply will depend on the fertility level of the soil and the kind of crops to be grown. On the basis of soil tests and other information, recommendations of proper amounts can be made. See your county agent for details.

Through bacteria on their roots, legume crops are able to obtain enough nitrogen for good yields. However, until the nodule bacteria become established on the legume roots, the legume must depend upon the soil for its supply of nitrogen. For this reason a small application of nitrogen is usually desirable for seedings of legumes (as well as other pasture and hay plants) to get them off

to a good start. If the soil is known to be well supplied with available nitrogen, the application of nitrogen at seeding time is not necessary for legume crops.

It is recommended that a small amount of boron in the form of borax be applied for alfalfa because this crop has a high requirement for boron and most Lawrence County soils do not provide enough in the available form for best yields. Fifteen to twenty pounds per acre per year of borax applied in the winter is recommended. Borax will help prevent yellowing of the leaves in the summer and help maintain the stand for a longer period of years. Red clover and crimson clover are sometimes benefited by applications of borax and their seed yield is often increased considerably. Also on some soils a few truck crops, as sweet potatoes, seem to be benefited by small amounts of borax. Other crops, however, as corn, cotton, and small grains, show no apparent benefit from borax treatments. Tobacco and a few other crops are injured by borax in amounts as small as 25 or 30 pounds per acre.

Farm manure—The fertility contained in the droppings of farm animals exceeds, in total amount, all of that purchased in commercial fertilizers by the farmers in Tennessee. Much of this fertility is left out in the pasture fields. The manure that is collected around the barn, however, is a very valuable source of fertility and organic matter, and its efficient use will contribute to higher yields and better soil conservation.

Much of the value of farm manure is lost during collection and storage. Adequate bedding should be used to absorb the liquid portions which are as valuable as the solids. Storage losses will be high unless care is taken to stack the manure in compact, rectangular-shaped piles. It is preferable to spread stored manure on a cool damp day when there is little wind, so as to minimize nitrogen losses due to volitilization. The manure should be worked into the soil as soon as possible after spreading. This can be done either by plowing or by discing. Because farm manure is such a dilute fertilizer, it often is used in relatively large quantities; five to ten tons per acre are commonly used on some crops. The greatest returns from a given amount of manure can be obtained by spreading it at moderate rates over more acres. Because farm manure is an unbalanced fertilizer proportionately higher in nitrogen and potash than in phosphate, it is usually desirable to use some phosphate fertilizer or fertilizer high in phosphate along with it. The phosphate can be mixed with the manure as it is being collected and stacked in the barnyard, or it can be spread on the soil either before or after the manure is applied. Farm manure is most effective on those crops which require nitrogen fertilization; that is, the non-legume crops. It is particularly valuable on truck crops, tobacco, corn, and cotton. If such crops are being grown, they should receive the manure rather than the pasture

and hay crops which in general include legume plants which do not need additional nitrogen once they are established.

Only about half the nitrogen in farm manure is available to the crop the first year. Some of the remaining nitrogen becomes available during the following season, and it is quite usual to see beneficial results from manure for more than one year after application.

Farm manure is a definite aid in helping to maintain the organic-matter level of cultivated soils, and its use makes it possible to carry on a more intensive row-cropping program than would be possible by the use of green-manure crops alone.

Organic matter maintenance—Organic matter is important in promoting a good mellow condition of the surface soil. Also, it is an important source of nitrogen for crop growth. When soils are cultivated, the organic matter tends to decompose more rapidly. In a row-cropping system, then, provision must be made to replenish the organic-matter supply at frequent intervals in order to keep the surface layer in mellow condition and to maintain a source of nitrogen for future crops.

On sloping lands organic matter may be depleted extremely rapidly by surface erosion. This is one of the important reasons for taking all necessary precautions to keep surface erosion down to a minimum.

The soils of Lawrence County were never very high in organic matter, and it is not economical to attempt to build up extremely large amounts of organic matter in them. It is important, however, to make frequent additions of organic matter to maintain a moderate level, comparable to what was in the soil originally.

Besides farm manure already mentioned, the other important sources of organic matter for addition to the soil are roots of the crops which are grown and the turning under of green-manure crops and plant residues. The amount of roots left in the soil by a crop will depend in part on the kind of crop; for example, alfalfa and red clover have much larger root systems than lespedeza. Another equally important factor in determining the amount of organic matter addition is the total yield of the crop. High yields are necessarily associated with vigorous plant growth and an extensive root system. Thus organic matter maintenance is made easier by liming and fertilizing to promote higher crop yields.

In choosing crops for green-manuring purposes, legumes are usually preferred since they are able to get their own nitrogen from the atmosphere by the aid of the nodule bacteria. Legumes such as red clover are more effective green-manure crops for organic matter maintenance than lespedeza; in the first place be-

cause of the larger root system, and in the second place because of the higher yields. Vetch, sericea, sweet clover, and crimson clover are other very important green-manure crops.

In the production of green-manure crops, it is often desirable to pasture the crop before using it as a green manure. The animal gains produced by the pasture may provide the necessary money for additional fertilizer materials which, in turn, will help increase future crop yields.

It is important to add organic matter frequently in moderate amounts rather than to attempt to use extremely large amounts at long intervals. This suggests that a desirable crop rotation is one in which the row crop is followed by a sod crop or green-manure crop which is not cultivated and which will furnish roots or both roots and tops for adding to the organic matter supply of the soil. As mentioned above, use of farm manures reduces the number of green manure crops needed for maintenance of an adequate organic-matter content in the soil.

Supplementary Erosion Control Practices

Cultivation of sloping land often results in accelerated erosion of the surface soil unless all management practices are handled in a very favorable fashion. On many farms, however, the available land is limited and it is necessary to cultivate sloping land more frequently than is desirable. Also, extreme weather conditions may cause failure of cover crops seedings and leave the land exposed unduly long to heavy rains. These and other problems in the management of sloping land under cultivation make it desirable to use supplementary erosion control practices in these situations. Supplementary erosion control practices include contour farming, strip cropping, and terracing.

Contour farming—Contour farming consists of plowing, planting, and cultivating on a level across and around the slope, rather than up and down hill. It provides ridges and furrows of soil which tend to intercept the water after heavy rains and thereby reduce erosion. On sloping land which is to be cultivated frequently, contour farming is very desirable as an aid in erosion control. On irregular topography a major disadvantage to contour farming is that the rows may have to be very crooked and many point rows may be necessary. Such irregular areas are best not used for row crops. Contour farming fits in well with strip cropping or terracing as discussed below.

Strip cropping—The practice of strip cropping consists of planting close-growing or sod crops in strips between strips of cultivated crops. Its purpose is to break the effective length of

rather long slopes subject to erosion. Usually the strips are on the contour for the most satisfactory results. On moderate slopes the cultivated strips may be anywhere from 100 to 150 feet wide whereas on steeper slopes the cultivated strips probably should not exceed 50 feet in width on the average.

Strip cropping involves the use of a crop rotation and the rotation sequence moves down the slope by strips rather than from field to field in the usual manner. The sod crop strips are usually followed by a cultivated crop and the former cultivated area is seeded down to small grains, a sod crop, or small grain to be followed by a sod crop. Thus in a three-year rotation of corn, wheat, red clover and orchard grass, there would be at least one strip of a close-growing crop between cultivated strips.

Contour strip cropping has the same general disadvantages as other contour practices; that is, it requires crooked rows and point rows which cause some inconvenience, particularly on irregular topography. Futhermore, with strip cropping there is always the problem of how to pasture the sod strips without allowing the cattle to graze on the other crops in the rotation at the same time. If the sod strips are to be pastured, temporary fencing is usually necessary; and this is a great inconvenience in most cases. Frequently some changes in field boundary fences need to be made. The land must be fertile and productive for a strip-cropping system to aid effectively in erosion control. Unless the close-growing crops get off to a rapid start and make a vigorous growth, the strips where they are planted will be subject to about as much erosion as the cultivated strips.

Although strip-cropping has merit when carried out properly on appropriate areas, it probably will not be used widely in Lawrence County because of the inconveniences and changes in farm operations it involves.

Terracing—On some slopes under intensive cultivation contour farming may not furnish adequate control of water runoff and erosion. Under such conditions terraces are desirable. In general terracing would not be recommended if contour farming alone provided adequate control of erosion.

The purpose of a terrace system is to intercept runoff water so as to allow more water to be absorbed by the soil and to lead the excess at a slow rate safely to a satisfactory outlet. In order to assure that a system of terraces will prove successful, the following three things are of great importance: (1) establishment of a satisfactory outlet for the terraces, (2) adjustment of terrace design to the soil conditions involved. and (3) maintenance of the terrace system after it is installed. It is very desirable to obtain the assistance of a person trained in terrace design and construction to make sure that the terrace system is properly installed.

Usually the terrace outlet should be developed before the terraces are built. It is difficult to establish vegetation in the outlets, for example, once the terraces are in operation and are likely to discharge water into the outlets at any time.

Soils which absorb water readily, have a good structure, are responsive to fertilization, and produce a good cover of vegetation rapidly are the ones most likely to give good results with terraces. Stony or eroded soils that are unresponsive to fertilization, and those with hardpan layers offer particular difficulties in a terracing program.

An established terrace system must have a certain amount of attention to keep it in proper working order. Cultivation on the contour helps to maintain the terrace ridges with less work. However, occasional breaks will occur in terraces and the outlets may need some attention from time to time. If maintenance is neglected, a terrace system is likely to do more harm than good.

Slopes steeper than about 10 per cent usually are not suited to terraces, nor is it ordinarily desirable to terrace slopes of less than about 2 per cent gradient. If slopes are too irregular, terraces usually are not advisable. The distance between terraces is generally about 100 to 150 feet on moderate slopes of 3 to 5 per cent; on steeper slopes of 8 to 10 per cent, a spacing of 40 to 50 feet might be needed. Further information about terracing is available from the Extension Service through your county agent.

Drainage

Yields of most crops can be increased on level wet lands by the removal of excess water. This is particularly true of most cultivated crops. Excess moisture prevents seed-bed preparation at the correct time and hence delays planting; also it may prevent root penetration or actually drown out the crop. Most farmers who have wet areas in their fields recognize the importance of drainage.

The most common method of removing excess water is by open ditches. A more expensive and more satisfactory method under certain conditions is the use of tile drains. Any drainage program, however, is more or less expensive; and the first decision to make is whether or not the investment in a drainage system will be profitable. Sometimes it is better to grow such plants as white clover and tall meadow fescue, which are well adapted to wet soils and will produce satisfactory pasture on them. Soils which are underlain by hardpans generally are difficult to drain and are not very responsive to management after drainage. The hardpan layer may still prevent the production of high yields of such crops as corn.

Wet soils which are deep and permeable usually prove very productive after drainage if well fertilized and limed. A drainage system of ditches or tile cannot be installed however unless an outlet is conveniently available. Although tile are rather expensive they do not interfere with cultivation as ditches do; and the cost of maintenance is very low if the tile are properly installed. Open ditches are relatively inexpensive to install but usually require considerable maintenance, and they interfere with the use of farm machinery. Large drainage ditches are needed of course to handle large volumes of water, and some sort of open ditch is needed as an outlet for tile.

On level fields where it is not convenient to use either ditches or tile, the practice of "bedding" is generally desirable. This consists of plowing the land in such a way as to leave dead furrows at frequent intervals to serve as shallow drainage ditches. Usually the distance between dead furrows is 50 feet or less, and the furrows lead toward some drainage outlet.

The planting of such row crops as cotton on slight ridges is actually a sort of bedding. The seed on the ridge are above the water table early in the season, and the furrows between the rows tend to act somewhat as small drainage ditches. This is desirable on wet fields that are not easily drained.

Irrigation

A dry spell long enough to reduce yields of most summer crops occurs practically every year in Lawrence County. Where an adequate supply of water is available, irrigation during such a dry spell is often very profitable. More and more farmers in Tennessee are beginning to use supplemental irrigation on some fields, particularly for high value crops. An overhead sprinkler system with portable pipe and sprinklers and a small engine for pumping is the equipment commonly used. Information about portable irrigation systems is available from the Extension Service through your county agent.

PASTURE MANAGEMENT

Productivity of permanent and rotational pastures can be increased greatly by annual fertilization, mowing, spreading of droppings, and grazing control.

Most farmers apply lime and fertilizer to the soil for a new pasture seeding. Addition of fertilizer at regular intervals is necessary to maintain high yields in an established pasture. Soil tests aid in determining the kind and amount of fertilizer to apply. Usually phosphate is more important than potash in a pasture fertilization program since most of the potash in pasture forage is recovered in the manure from the animal. Fertilizer is usually spread in the winter. It should be broadcast over the pasture be-

fore much growth starts. For better fall and winter grazing, it is sometimes desirable to spread fertilizer in August or September. It may be desirable to make an application of nitrogen at this time if the pasture mixture does not include clovers or other legumes. Maintenance applications of fertilizer containing both phosphate and potash should be made every year; if phosphate alone is being used, a larger amount may be applied every other year. Applications of lime to permanent pastures do not need to be made more often than once in about five or ten years. The need for lime can be determined by soil tests.

Cattle seldom graze an area uniformly and some coarse and unpalatable material, including many weeds, will not be eaten. Mowing will aid in weed control by preventing seed formation and also will encourage new growth of the pasture plants. At least two mowings a year will be needed, and under many conditions three or four mowings may be desirable.

Spreading the droppings will result in a more uniform pasture growth over the whole field and avoid the clumps that are so commonly observed in many pastures. Oftentimes it is possible to spread the droppings in the pasture by using an attachment on the mower bar. If this is not convenient, some other device such as a harrow, a few old automobile rims linked together, a chain, or even some brush may be pulled across the pasture to accomplish the same purpose.

To get high yields of pasture plants, it is important to control the grazing in such a way that there is enough leaf surface above ground to permit the rapid production of new plant tissue. Rotational grazing is one of the most satisfactory ways to control the growth of the pasture plants. This may be accomplished by dividing the pasture into four or five separate parts, preferably with an electric fence, and grazing each lot separately, usually for a week or less at a time. In this way the pasture plants can recover and produce new growth while the cattle are off the land for three or four weeks. If rotational grazing is not feasible, then care should be taken to avoid overgrazing of the pastures. If the pastures become too short, the cattle should be removed from the field entirely until further growth is produced.

FOREST MANAGEMENT PRACTICES

Most of the management practices employed in the production of forest may be grouped as follows: (1) the prevention of forest fires, trampling, and grazing by livestock or damage from other causes, (2) systematic cutting and removal of cull trees and weed species, and (3) harvesting of the mature trees in such a manner that desirable species may succeed them.

Fire prevention is a necessity, not only for satisfactory forest production but also to maintain maximum soil porosity

and erosion control. Control of grazing is necessary for similar reasons. Woodland grazing in Indiana under intensities of 2, 4, or 6 acres per animal unit without supplementary feeding resulted in serious deterioration of the animals over a six-month season. In Western North Carolina, six cows on 145 acres of farm forest lost weight when not given supplemental feed. Trampling by these cattle greatly decreased water infiltration. The timber-producing capacity is gradually destroyed by the repeated browsing and final curtailment of tree reproduction so that the natural regeneration of the stand is prevented. Compaction of the soil, disturbance of humus and resulting interference with soil porosity, lessen water absorption.

The cut-over woodland in Lawrence County contains much cull timber which hinders the development of potential crop trees. Farm woodlands can be improved materially by using inferior trees for fuel and other farm needs or by cutting them for pulpwood or chemical wood, reserving the vigorous trees of the better species to grow into more valuable timber crops. Areas severely ravaged by fire and areas of the blackjack-hardwoods forest type, which occupy the most difficult growing sites, might eventually be converted by tree planting into shortleaf pine or even Virginia pine. Sprouts from cut hardwood stumps would have to be kept down until the pine was well established. Sprouting may be prevented by poisoning low-grade standing timber with appropriate chemicals, and by applying chemicals to stumps of trees that were cut for their merchantable products.

Selective cutting would greatly increase timber production on the large areas of forest land in the county. The substitution of a program of harvesting "two-tie trees" rather than "one-tie trees" is desirable. Two-tie trees 16 inches DBH[4] grown in a period of 80 years or less rather than a one-tie 12-inch DBH tree in 60 years is a worthwhile goal. After several years under good management one could reasonably expect a growing stock or stand of 200 or more trees per acre on most forest sites. These trees, in order to insure that the land be continuously productive and at the same time produce harvest at relatively short time intervals, could reasonably be apportioned through eight different age or size classes as follows: 0-2, 2-4, 4-6, 6-8, 8-10, 10-12, 12-14, and 14-16 inches. Conscious effort and a period of time are necessary to convert the unmanaged forest into a managed forest containing size classes approximating the ones listed. Differences in soils and site will determine the length of time required to grow a 16-inch DBH tree of normal height, but field studies indicate that in this area up to 80 years is required. Harvest or selective cutting of the 16-inch trees within a ten-year period would yield 25 two-tie trees or even a perpetual annual harvest of 2½ trees or 5 cross-ties per acre.

[4] Diameter breast high.

SOIL LEGEND—LAWRENCE COUNTY, TENNESSEE
(numerically arranged)

Soil symbol	Soil name	Management group
2	Emory silt loam	2
4	Lobelville silt loam, local alluvium phase	2
4H	Pembroke silt loam, imperfectly drained variant	8
6	Greendale silt loam	2
7	Greendale cherty silt loam	2
8	Lee silt loam, local alluvium phase	9
10	Ennis cherty silt loam	1
12	Ennis silt loam	1
13	Lobelville cherty silt loam	1
14	Lobelville silt loam	1
15	Lee silt loam	9
16BL	Pace cherty silt loam, undulating phase	7
16BN	Pace cherty silt loam, eroded undulating phase	7
16CL	Pace cherty silt loam, rolling phase	7
16CN	Pace cherty silt loam, eroded rolling phase	7
16CP	Pace cherty silty clay loam, severely eroded rolling phase	10
16DL	Pace cherty silt loam, hilly phase	10
16DN	Pace cherty silt loam, eroded hilly phase	10
16DP	Pace cherty silty clay loam, severely eroded hilly phase	11
17BL	Pace silt loam, undulating phase	5
17BN	Pace silt loam, eroded undulating phase	5
17CL	Pace silt loam, rolling phase	6
17CN	Pace silt loam, eroded rolling phase	6
18BL	Minvale cherty silt loam, undulating phase	4
18BN	Minvale cherty silt loam, eroded undulating phase	4
18CL	Minvale cherty silt loam, rolling phase	4
18CN	Minvale cherty silt loam, eroded rolling phase	4
18CP	Minvale cherty silty clay loam, severely eroded rolling phase	4
18DL	Minvale cherty silt loam, hilly phase	10
18DN	Minvale cherty silt loam, eroded hilly phase	10
18DP	Minvale cherty silty clay loam, severely eroded hilly phase	10
22BL	Pickwick silt loam, undulating phase	3
22BN	Pickwick silt loam, eroded undulating phase	3
22CL	Pickwick silt loam, rolling phase	4
22CN	Pickwick silt loam, eroded rolling phase	4
22CP	Pickwick silty clay loam, severely eroded rolling phase	4
24AL	Paden silt loam, level phase	5
24BL	Paden silt loam, undulating phase	5
24BN	Paden silt loam, eroded undulating phase	5
24CL	Paden silt loam, rolling phase	6
24CN	Paden silt loam, eroded rolling phase	6
24CP	Paden silty clay loam, severely eroded rolling phase	10
26	Taft silt loam	8

Soil symbol	Soil name	Management group
28	Robertsville silt loam	9
29	Humphreys silt loam	2
30	Humphreys cherty silt loam	2
32BN	Decatur silty clay loam, eroded undulating phase	3
32CL	Decatur silt loam, rolling phase	4
32CN	Decatur silty clay loam, eroded rolling phase	4
32CP	Decatur silty clay loam, severely eroded rolling phase	4
36BL	Baxter cherty silt loam, undulating phase	4
36BN	Baxter cherty silt loam, eroded undulating phase	4
36CL	Baxter cherty silt loam, rolling phase	4
36CN	Baxter cherty silt loam, eroded rolling phase	4
36CP	Baxter cherty silty clay loam, severely eroded rolling phase	4
36DL	Baxter cherty silt loam, hilly phase	10
36DN	Baxter cherty silt loam, eroded hilly phase	10
36DP	Baxter cherty silty clay loam, severely eroded hilly phase	10
36EL	Baxter cherty silt loam, steep phase	10
36EN	Baxter cherty silt loam, eroded steep phase	10
36EP	Baxter cherty silty clay loam, severely eroded steep phase	11
37CL	Sulphura cherty silt loam, rolling phase	7
37CN	Sulphura cherty silt loam, eroded rolling phase	7
37DL	Sulphura cherty silt loam, hilly phase	10
37DN	Sulphura cherty silt loam, eroded hilly phase	10
37CP	Sulphura cherty silt loam, severely eroded rolling phase	10
37DP	Sulphura cherty silt loam, severely eroded hilly phase	11
37EL	Sulphura cherty silt loam, steep phase	11
37EN	Sulphura cherty silt loam, eroded steep phase	11
37EP	Sulphura cherty silt loam, severely eroded steep phase	11
38BL	Bodine cherty silt loam, undulating phase	7
38BN	Bodine cherty silt loam, eroded undulating phase	7
38CL	Bodine cherty silt loam, rolling phase	7
38CN	Bodine cherty silt loam, eroded rolling phase	7
38CP	Bodine cherty silt loam, severely eroded rolling phase	10
38DL	Bodine cherty silt loam, hilly phase	10
38DN	Bodine cherty silt loam, eroded hilly phase	10
38DP	Bodine cherty silt loam, severely eroded hilly phase	11
38EL	Bodine cherty silt loam, steep phase	11
38EN	Bodine cherty silt loam, eroded steep phase	11
38EP	Bodine cherty silt loam, severely eroded steep phase	11
41AL	Pembroke silt loam, level phase	3
41BL	Pembroke silt loam, undulating phase	3
41BN	Pembroke silt loam, eroded undulating phase	3
42BL	Decatur silt loam, undulating phase	3
42BN	Decatur silt loam, eroded undulating phase	3
42CL	Decatur silt loam, rolling phase	4
42CN	Decatur silt loam, eroded rolling phase	4
42CP	Decatur silty clay loam, severely eroded rolling phase	4
43BL	Bewleyville silt loam, undulating phase	3
43BN	Bewleyville silt loam, eroded undulating phase	3

Soil symbol	Soil name	Management group
44BL	Bewleyville silt loam, undulating shallow phase	3
44BN	Beweyville silt loam, eroded undulating shallow phase	3
44CL	Bewleyville silt loam, rolling shallow phase	4
44CN	Bewleyville silt loam, eroded rolling shallow phase	4
44CP	Bewleyville silty clay loam, severely eroded rolling shallow phase	4
45BL	Mountview silt loam, undulating phase	5
45BN	Mountview silt loam, eroded undulating phase	5
46BL	Mountview silt loam, undulating shallow phase	5
46BN	Mountview silt loam, eroded undulating shallow phase	5
46CL	Mountview silt loam, rolling shallow phase	6
46CN	Mountview silt loam, eroded rolling shallow phase	6
46CP	Mountview silty clay loam, severely eroded rolling shallow phase	10
47A	Dickson silt loam, level dark-surface variant	5
47BL	Dickson silt loam, undulating dark-surface variant	5
47BN	Dickson silt loam, eroded undulating dark-surface variant	5
47CN	Dickson silt loam, eroded rolling dark-surface variant	6
47CP	Dickson silty clay loam, severely eroded rolling dark-surface variant	10
48BL	Dickson silt loam, undulating phase	5
48BN	Dickson silt loam, eroded undulating phase	5
48CL	Dickson silt loam, rolling phase	6
48CN	Dickson silt loam, eroded rolling phase	6
48CP	Dickson silty clay loam, severely eroded rolling phase	10
49AL	Sango silt loam, level phase	8
49BL	Sango silt loam, undulating phase	8
49BN	Sango silt loam, eroded undulating phase	8
50AL	Lawrence silt loam, level phase	8
50BL	Lawrence silt loam, undulating phase	8
50BN	Lawrence silt loam, eroded undulating phase	8
52	Guthrie silt loam	9
72	Mines, pits, and dumps	11
74	Stony hilly land, Bodine soil material	11
75	Stony steep land, Bodine soil material	11
78D, E	Rockland, limestone or shale material	11
132BN	Ashburn cherty silt loam, eroded undulating phase	4
132CN	Ashburn cherty silt loam, eroded rolling phase	4
132CP	Ashburn cherty silty clay, severely eroded rolling phase	4
132DL	Ashburn cherty silt loam, hilly phase	10
136BL	Baxter cherty silt loam, undulating light-surface phase	7
136BN	Baxter cherty silt loam, eroded undulating light surface phase	7
136CL	Baxter cherty silt loam, rolling light-surface phase	7
136CN	Baxter cherty silt loam, eroded rolling light-surface phase	7
136CP	Baxter cherty silty clay loam, severely eroded rolling light-surface phase	10
136DL	Baxter cherty silt loam, hilly light-surface phase	10
136DN	Baxter cherty silt loam, eroded hilly light-surface phase	10
136DP	Baxter cherty silty clay loam, severely eroded hilly light-surface phase	11
136EL	Baxter cherty silt loam, steep light-surface phase	11

Soil symbol	Soil name	Management group
136EN	Baxter cherty silt loam, eroded steep light-surface phase	11
136EP	Baxter cherty silty clay loam, severely eroded steep light-surface phase	11
138BL	Bodine fine cherty silt loam, undulating phase	7
138BN	Bodine fine cherty silt loam, eroded undulating phase	7
138CL	Bodine fine cherty silt loam, rolling phase	7
138CN	Bodine fine cherty silt loam, eroded rolling phase	7
138CP	Bodine fine cherty silt loam, severely eroded rolling phase	10
138DL	Bodine fine cherty silt loam, hilly phase	10
138DN	Bodine fine cherty silt loam, eroded hilly phase	10
138DP	Bodine fine cherty silt loam, severely eroded hilly phase	11
138EL	Bodine fine cherty silt loam, steep phase	11
138EN	Bodine fine cherty silt loam, eroded steep phase	11
138EP	Bodine fine cherty silt loam, severely eroded steep phase	11
R	Riverwash	11

SLOPE CLASSIFICATION LEGEND

A	0 to 2 percent	nearly level
B	2 to 5 percent	undulating
C	5 to 12 percent	rolling
D	12 to 25 percent	hilly
E	25 to 60 percent	steep
F	60 percent and over	very steep

No slope symbols are used for soils of the stream bottoms, the Humphreys, Taft, and Robertsville soils of the stream terraces, and the Guthrie soil of the uplands. All are considered to have nearly level surfaces although there may be a few places where the gradient ranges to nearly 3 percent. No slope symbols are used for the Greendale, Tigrett, and Briensburg soils. They have a gently sloping to sloping surface, the gradient ranging from 1 to 6 percent. No A or nearly level slope class is used for soils of the old colluvial land, soils of the stream terraces other than Humphreys, Taft, and Robertsville, and soils of the uplands other than Guthrie. The B or undulating slope class for these soils ranges from 1 to 5 percent. No B or undulating class is used for the Bodine and Baxter soils. The C or rolling class for these soils ranges from 4 to 12 percent.

EROSION CLASSIFICATION LEGEND

L = virtually uneroded
N = moderately eroded
P = severely eroded

Erosion symbols are not used for soils of the bottom lands and young colluvial lands, the Humphreys, Taft, and Robertsville soils of the stream terraces, and the Guthrie soil of the uplands as erosion is not significant on these. Neither are they used for the miscellaneous land types.

A GROUPING OF THE SOIL SERIES OF LAWRENCE COUNTY, TENNESSEE, ACCORDING TO THEIR POSITION AND A BRIEF DESCRIPTION OF THEIR PARENT MATERIALS, SLOPE, DRAINAGE, AND MOST IMPORTANT SOIL LAYERS

Soil Series	Parent Material (Parent Rock)	Slope	Drainage	Surface soil[1]	Subsoil
Soils of the Uplands					
Ashburn	Cherty high-grade limestone	Undulating to hilly	Well to somewhat excessively drained	Dark-brown cherty silt loam	Reddish-brown or red cherty silty clay
Baxter	Cherty limestone	Undulating to steep	do	Light-brown or brown cherty silt loam	Yellowish-red cherty silty clay
Bodine	Very cherty limestone	Rolling to steep	Well to excessively drained	Light brownish-gray cherty silt loam	Brownish-yellow cherty silt loam to silty clay loam
Sulphura	Mixed shale and chert	Rolling to steep	do	Gray cherty silt loam	Brownish-yellow cherty silt loam
Decatur	High-grade limestone	Undulating to rolling	Well drained	Dark red-brown silt loam	Dark red silty clay
Mountview	20 to 42 inches loess over cherty limestone residuum	do	do	Light brownish-gray silt loam	Yellowish-brown silty clay loam
Bewleyville	do	do	do	Brown silt loam	Yellowish-red silty clay loam
Dickson	do	do	Moderately well drained	Light brownish-gray silt loam	Yellowish-brown silty clay loam grading to mottled hardpan
Sango	do	Nearly level to undulating	Somewhat poorly to moderately well drained	Gray silt loam	Brownish-yellow silty clay loam grading to mottled hardpan
Lawrence	do	Nearly level	Somewhat poorly drained	Gray silt loam	Pale-yellow to mottled silty clay loam
Guthrie	do	do	Poorly drained	Light-gray silt loam	Gray, mottled silty clay
Pembroke	20 to 42 inches silt (loess) over high-grade limestone	Nearly level to undulating	Well drained	Brown to dark-brown silt loam	Strong-brown to red silty clay loam
Soils of the Stream Terraces and Old Colluvial Slopes					
Humphreys	Chiefly cherty limestone residuum (low terrace)	Nearly level to undulating	Moderately well to well drained	Brownish-gray silt loam	Yellowish-brown silty clay loam
Minvale	Chiefly cherty limestone (colluvium)	Undulating to hilly	Well drained	Pale-brown cherty silt loam	Reddish-yellow cherty silty clay loam
Pace	do	Undulating to rolling	Moderately well to well drained	Pale-brown cherty silt loam	Yellowish-brown grading to mottled cherty silty clay loam
Pickwick	Loess over limestone residuum	do	Well drained	Grayish-brown silt loam	Reddish-brown silty clay loam
Paden	do	do	Moderately well drained	Pale-brown silt loam	Yellowish-brown silty clay loam grading to mottled hardpan
Taft	Limestone residuum or loess over limestone residuum	Nearly level	Somewhat poorly drained	Gray or light-gray silt loam	Pale-yellow to mottled silty clay loam
Robertsville	do	do	Poorly drained	Gray to light-gray silt loam	Light gray to gray, mottled plastic clay
Soils of the Bottom Lands and Young Colluvial Slopes					
Ennis	Cherty limestone residuum, some loessial material intermixed	Nearly level	Moderately well to well drained	Brown silt loam to cherty silt loam	Brown grading to slightly mottled silt loam
Lobelville	do	do	Somewhat poorly drained	Brown or pale-brown silt loam to cherty silt loam	Mottled silt loam to silty clay loam
Lee	do	do	Poorly drained	Pale-brown to gray silt loam	Gray, mottled silty clay loam
Greendale	do	Nearly level to gently sloping	Moderately well to well drained	Grayish-brown silt loam or cherty silt loam	Yellowish-brown silty clay loam or cherty silty clay loam
Lobelville local alluvium phase	do	do	Somewhat poorly to moderately well drained	Brown or pale-brown silt loam to cherty silt loam	Mottled silt loam or silty clay loam
Lee, local alluvium phase	do	do	Poorly drained	Pale brown to gray silt loam	Gray, mottled silty clay loam
Emory	High-grade limestone residuum	do	Moderately well to well drained	Brown to dark-brown silt loam	Reddish-brown silty clay loam

[1] Descriptions apply to unroaded areas.