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Kentucky Soil Atlas

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USDA Natural Resources and Conservation Service

KENTUCKY SOIL ATLAS

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In Cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE

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PREFACE

Kentucky has a diverse array of geologic, topographic, physiographic, ecological, and aquatic features that have contributed to the development and present characteristics and productivity of the soils in the state. This Soil Atlas has been prepared as an aid to further the knowledge of soils in our state and provide a basic exposure of Kentucky's soil resources to educators, students, natural resource planners, policy makers, citizens and visitors. The objective of the publication is to present the prominent characteristics of representative soils and how they may affect soil use and management. The Atlas is meant to give a generalized view of the soil resources in the state and serve as an introduction to understanding their complex nature. More complete information about the soils found in Kentucky is available in the Web Soil Survey (https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm) and archived PDF files of the soil survey manuscripts (https://nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=KY).


Fig. 1. A field description of a soil often requires a team effort.


Fig. 2. A roadside soil cut is usually an easy way to describe a soil profile.

The information compiled in this publication is a product of great efforts by many soil scientists throughout the state over the last 50 years. These efforts included strong collaborations among the Kentucky USDA Natural Resources Conservation Service, the University of Kentucky, the US Forest Service and the Kentucky Natural Resources and Environmental Protection Cabinet. Employees of these agencies have worked for decades to map the state soils and produce the information needed for developing improved land-use planning and resource management practices.

Fig. 3. A push probe can provide some preliminary soil information in soil areas without gravel or rock fragments.

Fig. 4. A bucket auger is more efficient for preliminary surveys of inaccessible or fragmental soils.

Fig. 5. Truck mounted hydraulic probes have considerably facilitated soil sampling in the last 20 years.

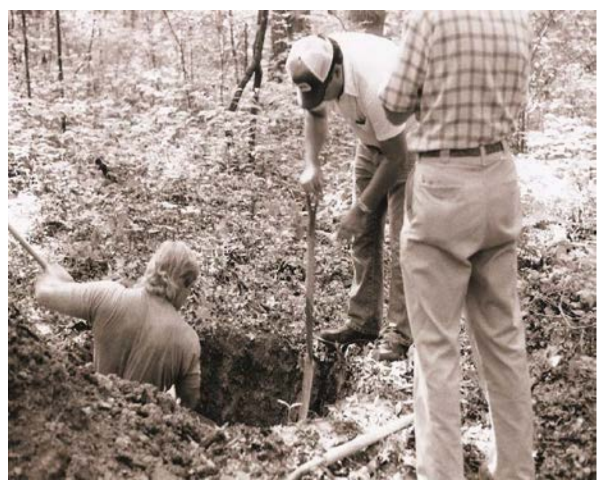

Fig. 6. Hand-digging a soil pit is still the only way you can obtain a soil description in inaccessible areas.

Fig. 7. Excavating a soil pit with a backhoe is always the easiest way to describe a soil regardless of weather conditions.

Fig. 8. A lot of interesting soil discussions occur at the back of the probe truck.

An assortment of landscape, geology, and soils images along with associated maps has been included in this publication to document the uniqueness of Kentucky's soils and other resources. It was impractical to present information about all the soils mapped in the state. Instead, certain soils were selected from different regions based on their importance, areal extent, or uniqueness of their characteristics. Many of the selected soil profile images and some landscape pictures have been published in soil survey reports. Others have been obtained by soil scientists, colleagues, and University of Kentucky extension agents. Geology and some physiography maps were obtained from the Kentucky Geological Survey. Other maps have been acquired from various web sites or generated by USDA-NRCS personnel. Each depicted soil is classified according to the Soil Taxonomy System. Soil profile descriptions and characterization data for selected soils have also been included to provide additional information for some important soils. These data were produced by the Pedology Laboratory of the University of Kentucky. Additional soil characterization data for about 1000 soil sites in the state have been published in several reports and are also available from the National Cooperative Soil Survey Soil Characterization Database.

Fig. 9. Taking accurate soil horizon and depth measurements are an important part of describing a soil.

Fig. 10. Soil color determination provides important information about the properties of the soil.

Fig. 11. Some soils have special features that provide important information about their properties and behavior.

Special thanks are extended to all of those who participated in the collection and review of the information and the images included in this document.

Fig. 12. Field trip in the Western Coalfields Region during the 2014 Southern Region National Cooperative Soil Survey Conference.

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Fig. 14. Transferring field collected soil data to maps and delineating soil boundaries.

Fig. 15. Soil samples are analyzed in the laboratory to provide additional characterization data for accurate soil identification and classification.

The Atlas of Kentucky Soils was made possible by a cooperative agreement between the Kentucky Natural Resources Conservation Service and The University of Kentucky College of Agriculture, Food and the Environment.

Fig. 16. Educating farmers and extension agents about the importance of soil properties for crop production.

Fig. 17. Teaching college students about Kentucky soils.

Fig. 18.   A soil scientist introduces soils to school kids.

ACKNOWLEDGEMENTS

The authors acknowledge and thank all the soil scientists, pedologists, engineers, biologists and field research and extension specialists who over the years have and continue to refine our understanding of Kentucky's soils. This publication would not have been possible without the data they collected in the field and the soil use interpretations developed from these data.

Special gratitude is expressed to Yvonne Thompson for her assistance in developing the Kentucky Soil Characterization Database and her dedicated efforts in the preparation of this publication. Also, to David Chan for his assistance in the acquisition and refinement of the Kentucky maps.

The following individuals are also especially acknowledged for their various contributions to this document:

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INTRODUCTION

Located in the eastern US, the Commonwealth of Kentucky ranks 37th in size among the 50 states. Before settlement, Kentucky's native vegetation consisted primarily of deciduous forests with two extensive grassland areas. In central Kentucky, an ash-oak savannah was comprised of native cane, grasses, and forbs that grew beneath widely scattered ancient trees, while in the Western Pennyroyal an area known as the Barrens was dominated by prairie grasses and forbs. Large herds of bison and other wildlife were present, especially near salt licks. The name "Kentucky" means "meadow lands" in several different Indian languages and was specifically applied to this region. Europeans adopted it to refer to the state. It is also known as the Bluegrass State because of the vast expanses of Bluegrass (*Poa pratensis*), whose blue-purple buds lend a bluish tint to the landscape. Kentucky is about 380 miles long and 140 miles wide with a population of 4,425,000 (2015). It covers an area of 40,409 sq mi (104,659 sq km), of which land makes up 39,669 sq mi (102,743 sq km) and inland water 740 sq mi (1,917 sq km). It is bordered by Illinois, Indiana, and Ohio to the north, Tennessee to the south, West Virginia and Virginia to the east and Missouri to the west. The highest point in Kentucky is Black Mountain at 4,139 feet, and the lowest point at the Mississippi River is 257 feet above sea level. Major waterways include the Ohio, Mississippi, Kentucky, Cumberland, and Green Rivers, and the lakes Kentucky, Barkley, and Cumberland. Kentucky has more miles of running water than any other state except Alaska. The numerous rivers and water impoundments provide 1,100 commercially navigable miles (1,770 kilometers).

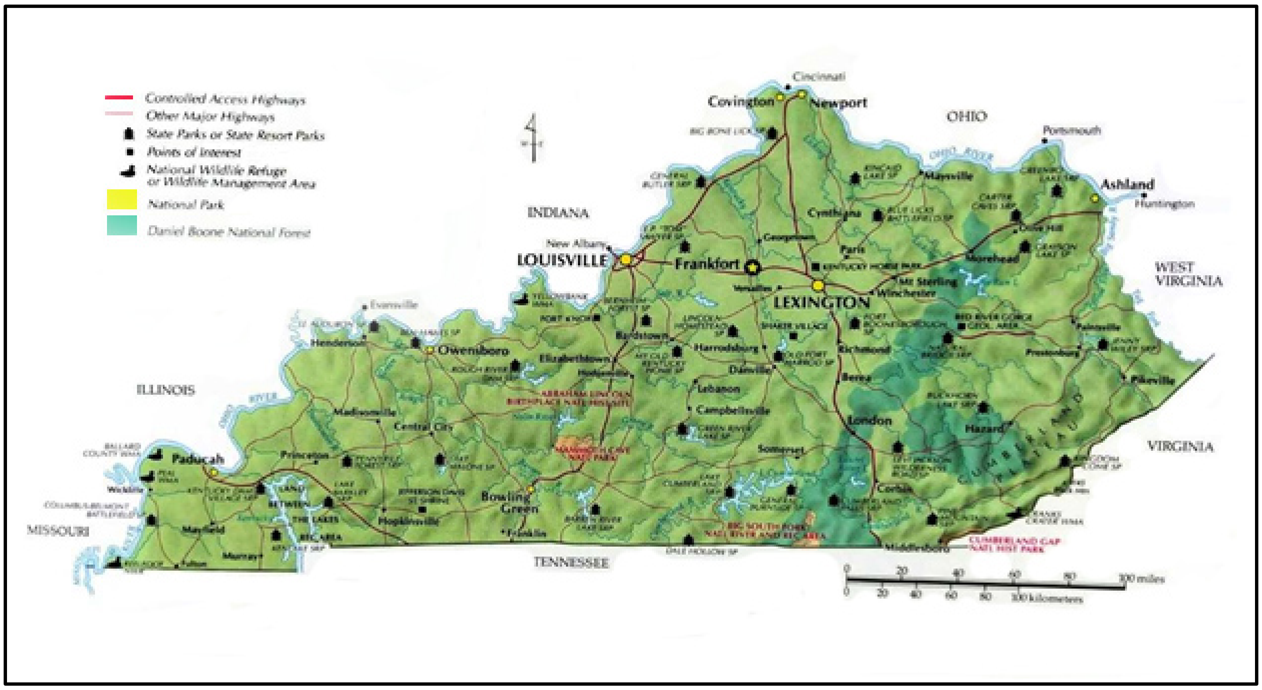


Fig. 19. Map of Kentucky with major cities and highways (USGS).

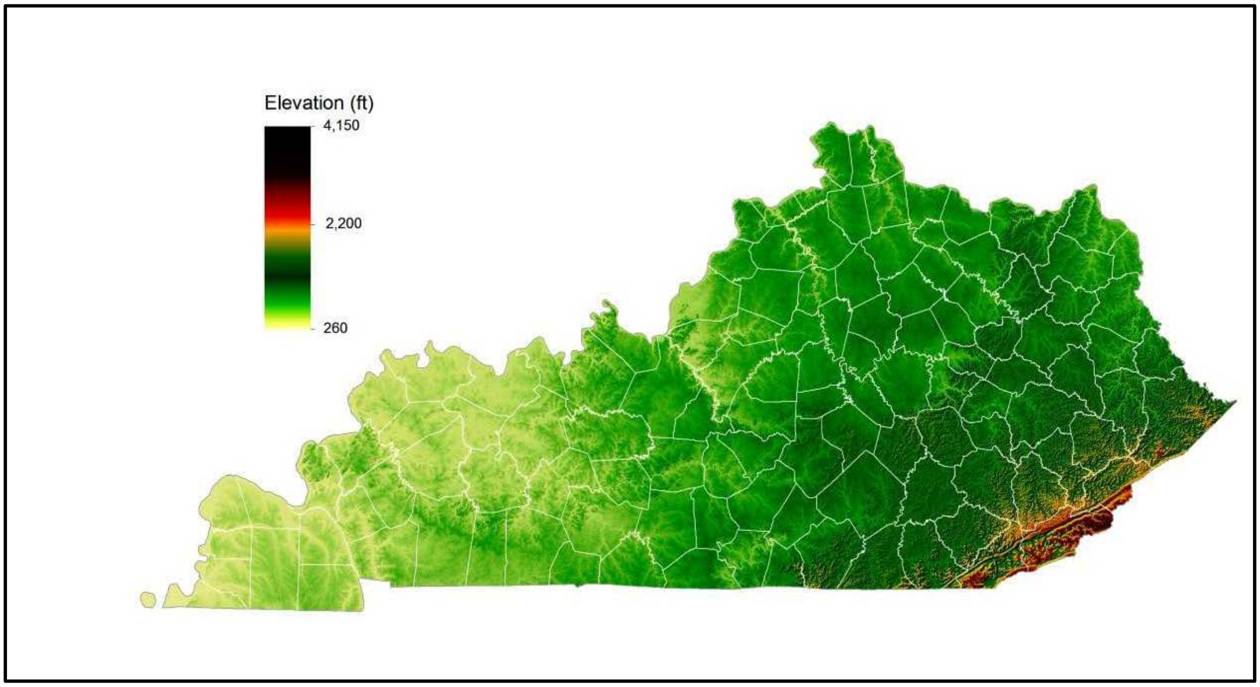


Fig. 20. A general relief map of Kentucky (USDA-NRCS).

In spite of its relatively small size, Kentucky's rich natural resources include forested mountains in the east, rolling hills in central Kentucky, and the most intensive agricultural land in the west. Clear lakes and streams, and abundant wildlife are present throughout the state. About 50% of Kentucky's land area (12.7 million acres) is commercial forest land. The primary tree species are white oak, red oak, walnut, yellow poplar, beech, sugar maple, white ash and hickories. Kentucky ranks third among hardwood producing states. The Bluegrass State is famous for thoroughbred farms, tobacco farms, fine bourbon, and, of course, the Kentucky Derby. The state is home to nearly 750,000 acres of national and state forests (including Daniel Boone National Forest) and a stellar system of 52 state parks with many natural attractions, featuring fishing and boating lakes, hardwood forests with hiking trails, spectacular waterfalls, as well as white water rafting and canoeing expeditions. National Park Service lands include Cumberland Gap, the Big South Fork National River and Recreation Area, and Mammoth Cave, the longest cave system in the world. Kentucky's state bird is the cardinal, wild animal the gray squirrel, flower the goldenrod, tree the tulip (yellow) poplar, fossil the brachiopod, and soil the Crider.

Fig. 21. Eastern Kentucky mountain scenery - Fern Lake viewed from Cumberland Gap (Emilio Cogliani).

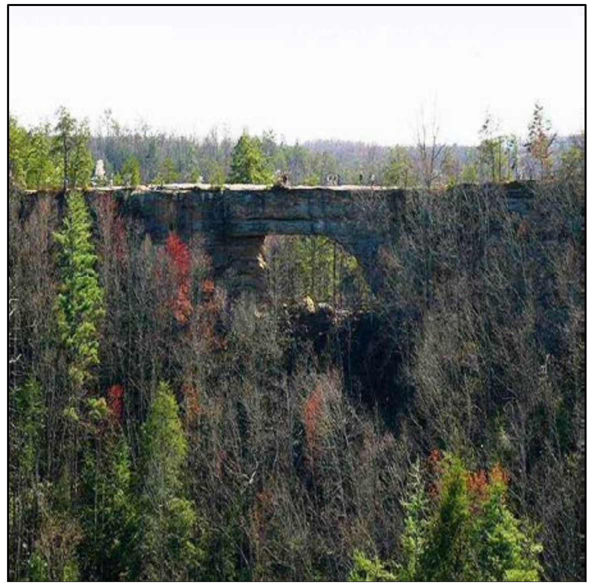


Fig. 22. Natural Bridge, a magnificent sandstone arch in eastern Kentucky (A. D. Karathanasis).

Fig. 23. Scenic Cumberland Falls on the Cumberland River in southern Kentucky (J. Archambeault).

Fig. 24. Murphy's Pond along a Mississippi River tributary (Obion Creek) in the Purchase Region (ectotherms.net).

Agriculture is a very important part of Kentucky's economy. In terms of revenue generated, the top five agricultural products are horses/mules, broilers (young chickens), cattle and calves, tobacco, and soybeans. Livestock and livestock products generate revenues that amount to about 66% of Kentucky's agricultural economy. Thoroughbred horses and beef cattle are Kentucky's most important livestock products. Horse sales and stud fees generated $810 million in cash receipts in 2012. This does not count the many horses born and raised on Kentucky farms, but owned by out of state interests, most of which are the thoroughbreds that made the Kentucky Derby so famous.

Fig. 25. Thoroughbreds in the Bluegrass morning haze.

Fig. 26. Cattle grazing in Cumberland County, KY (Smithsonian).

Beef cattle production has become an increasingly important sector for many farms during the transition away from tobacco production. Overall, about half of all farms in Kentucky owned cattle in 2012. That's not surprising, considering Kentucky has some of the best cattle pasture in the United States. Kentucky is home to 2.15 million cattle, making it the 14th largest cattle state in the nation. Cattle and calves raised in Kentucky generated $656.71 million in cash receipts in 2012. Poultry production has also emerged as a leading agriculture activity in the last 25 years. Broiler production on 826 Kentucky farms in 2012 totaled 761 billion head ranking the state 7th nationally. Other livestock products include milk, eggs, and hogs. Cash receipts for Kentucky dairy products totaled $219.58 million and chicken eggs brought in an impressive $116 million in cash receipts in 2012.

While livestock is an important element of our agriculture, there are plenty of other aspects to Kentucky farming. Soybeans and corn are the leading crops. Nearly 1.47 million acres of farmland were dedicated to soybeans, with farmers selling more than $752 million worth of the crop in 2012. Kentucky farmers harvested enough soybeans to produce 88.2 million gallons of biodiesel, or 1.5 gallons per bushel. Corn was harvested from 1.53 million acres with sales totaling $694 million in 2012. Kentucky farmers harvested enough corn to make 9.23 billion boxes of corn flakes.

Fig. 27. Corn-soybean field landscape in western Kentucky (Glynn Beck).

Fig. 28. Wheat at harvest in the Western Pennyroyal (Chad Lee).

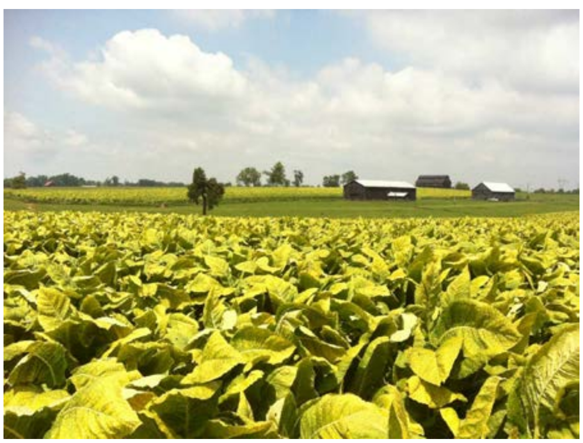


Fig. 29. Tobacco field and barns in the Bluegrass (Adam Probst).

Fig. 30. Hayfield landscape in the Knobs region.

Tobacco continues to be an important crop. Despite the continuing decrease in farms raising tobacco, Kentucky still has the largest number of tobacco farms in the United States with more than 4,500 in 2012. This is a significant drop from the more than 8,000 tobacco farms the Census counted in 2007, but there are still nearly 3 times as many farms as in North Carolina, which is in distant second place in this category. Tobacco was harvested from approximately 74,000 acres in 2012. This crop generated $384.88 million in cash receipts. Kentucky ranks second in the nation in tobacco production. Kentucky's 2012 wheat crop was enough to produce 1.22 billion pounds of pasta and generate $201.34 million in cash receipts. Hay production in Kentucky has been steadily increasing over the years. Farmers harvested 2.6

million acres in 2012, up from 2.31 million in 2011, and generated $142.37 million in cash receipts. Although of smaller significance to the agricultural economy, tomatoes are a leading "vegetable" crop and apples are the top fruit crop.

Kentucky is the birthplace of Bourbon, crafting 95 percent of the world’s supply. Only the Bluegrass State has the perfect natural mix of climate conditions and pure limestone water necessary for producing the world’s greatest Bourbon. Bourbon is a $3 billion signature industry in Kentucky, generating 15,400 jobs with an annual payroll of $707 million. Spirits production and consumption pours more than $166 million into state and local tax coffers every year. Bourbon production has increased more than 170 percent since 1999 (485,020 barrels compared to 1,306,375 in 2014), with premium small batch and single barrel brands driving the Bourbon renaissance.

Fig. 31. The Woodford Reserve Bourbon Distillery in the Bluegrass of Kentucky (A. D. Karathanasis).

Fig. 32. Kentucky’s Lost River Cave near Bowling-Green, Kentucky.

Kentucky is a leading coal producing state. Other mined products are natural gas, petroleum, and limestone. The total value of Kentucky's mineral production in 1999 was $3.8 billion. Principal minerals and by-products produced in order of value are coal, crushed stone, natural gas and petroleum. After more than two centuries of commercial mining operations, Kentucky’s domestic supply of coal remains an important component of the Commonwealth’s economy. In 2013, Kentucky ranked as the third highest coal producer in the United States at 80.5 million tons. Coal continued to supply a majority of energy in Kentucky and remained the largest source of domestic energy production in the Commonwealth. At the end of 2013, coal mines in Kentucky directly employed 11,885 people and mining directly contributed billions of dollars to the economy of Kentucky. Over 30 percent of the coal produced in Kentucky was consumed within the Commonwealth. However, the largest market for Kentucky coal remains the generation of electrical power across the United States, primarily in the southeast.


Fig. 33. Aerial view of strip mining in East KY (Anonymous).

The manufacture of transportation equipment (motor vehicles, motor vehicle parts, aircraft parts, boat trailers and railroad cars) is a significant contributor to Kentucky's economy. Production of chemicals (cleaning products, pharmaceutical products, paints, industrial chemicals, industrial gases) and machinery (elevators, air filtration equipment, conveyors, heating and air-conditioning equipment, printers, compressors) is also important.


Fig. 34. Canoeing on the Kentucky River.


Fig. 35. Thoroughbred racing at Keeneland Race Track.


Fig. 36. A deer herd in a snowy landscape (A. D. Karathanasis).

PHYSIOGRAPHY OF THE LAND

The physiography of Kentucky has developed from a series of dissected plateaus and gently rolling plains separated by distinct erosional remnants or escarpments. Kentucky lies mainly in the regions of the Appalachian Plateau and Interior Low Plateaus with the southeastern corner touching the belt of Appalachian folding and thrust faulting. The Purchase area of western Kentucky is within the Gulf Embayment or Coastal Plain.

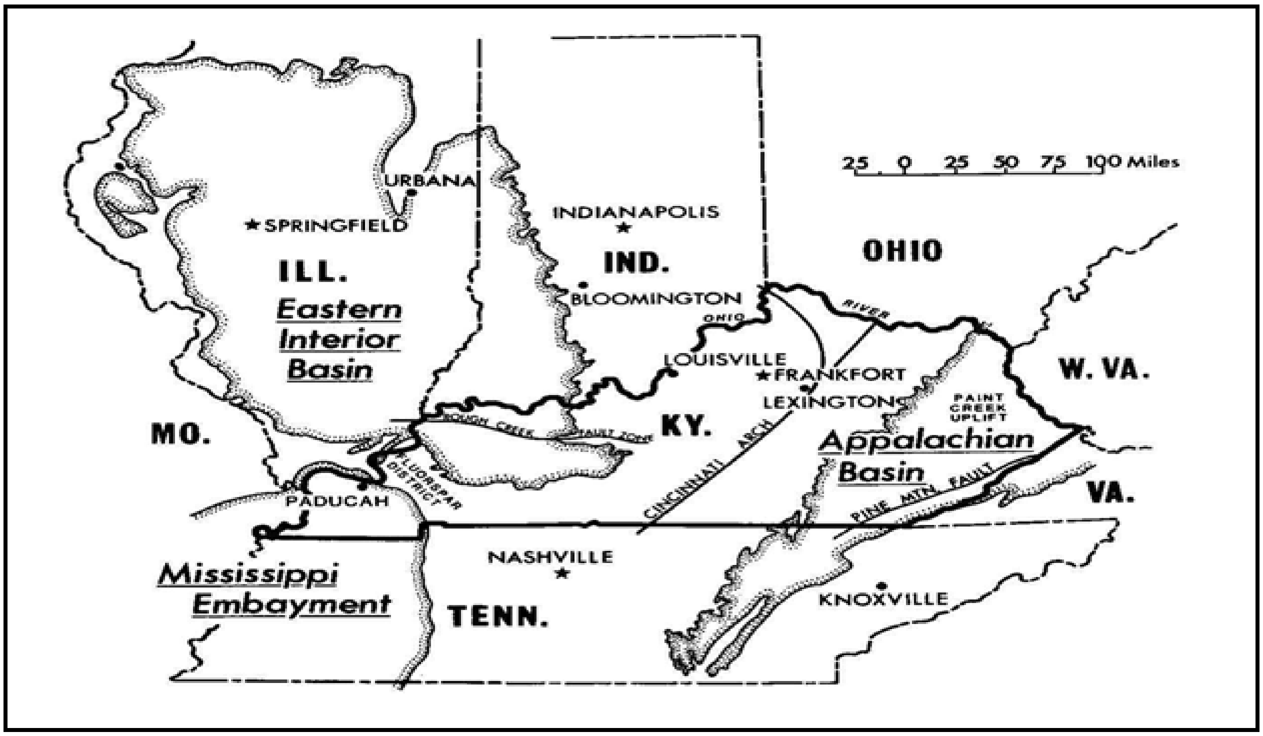


Fig. 37. Regional structural geology map (KGS).

Beneath the mountains of eastern Kentucky there lies the western edge of a great structural depression known as the Appalachian geo-syncline, a feature of the Paleozoic Era. Over time, the sedimentary rocks formed in it were folded and faulted into mountain ranges that brought an end to the geosyncline. These mountains extended northwest to Pine Mountain and were later destroyed by erosion (base-leveled). The present day parallel mountain ridges from Pine Mountain southeast formed independently on the outcropping edge of a resistant stratum or mass of rock. Deeply incised dendritic stream patterns and colluvium-covered mountain slopes are common features of this region. In contrast, the area northwest of Pine Mountain, as well as the area between Pine and Cumberland Mountains, consists of plateaus on horizontally oriented rock strata that are well dissected by erosion (valley cutting).

In Central Kentucky there is an immense structural arch known as the Jessamine Dome or Cincinnati Arch, which drops both to the north and south. North of Cincinnati, Ohio, it breaks into two prongs which pass on either side of the Michigan Basin, while to the south it rises again near Nashville, Tennessee with an intervening sag in south central Kentucky. West of the Cincinnati Arch there is a structural depression, known as the West Kentucky Coal Basin. This basin is in the southern end of a basin extending north into Illinois and Indiana (actual trend N-S). The extreme western part of the state lies on the eastern edge of the Ozark Dome, another great structural uplift. Some of this has been eroded away and covered by Cretaceous and Eocene sediments which in Kentucky dip toward the Mississippi River and are extensively mantled with Pleistocene loess or recent alluvium. This area represents the northern end of a once larger Gulf of Mexico.

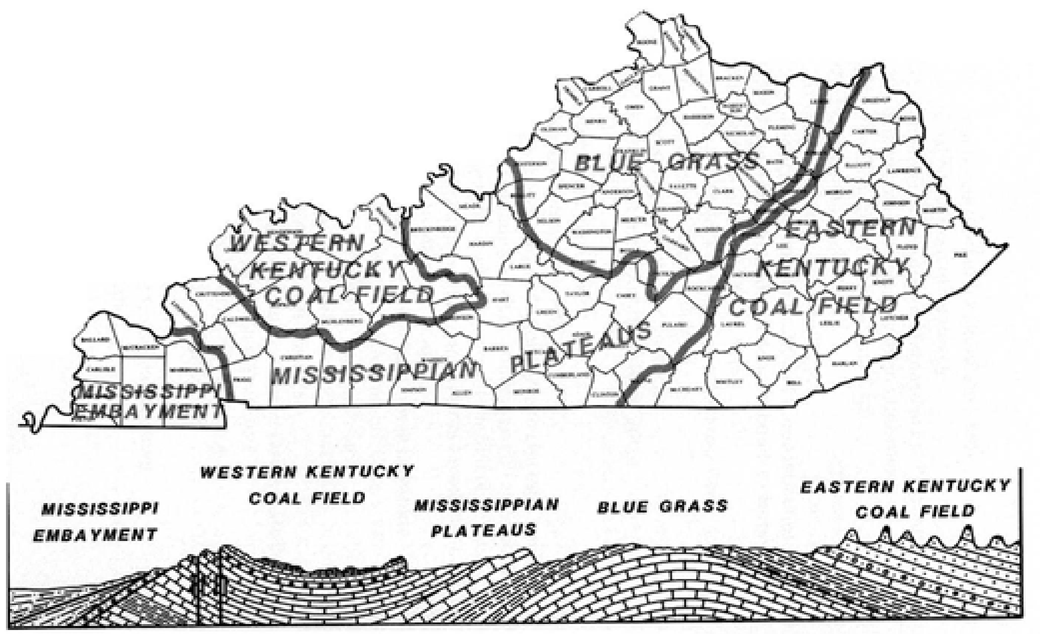


Fig. 38. Kentucky's structural geology map (KGS).

The majority of rocks outcropping in the state range from mid-Ordovician to Pennsylvanian, with some Cretaceous and Lower Tertiary exposed in the Jackson Purchase and vicinity. Pleistocene alluvium occurs abundantly in the valleys of western Kentucky and in the Ohio River Valley and its tributaries. Glacial drift, of Pleistocene age, is found along the Ohio River from Oldham to Bracken Counties, with occasional older erratics found farther south. Much folding and faulting has occurred along Pine Mountain and in southeastern Kentucky. Intense faulting has also taken place in the Western Pennyroyal areas. Basic igneous rocks occur only as dikes in

Elliot County in eastern Kentucky and in Caldwell and Crittenden Counties and vicinity in western Kentucky.

The general topography, except in the southeast, is that of several plateau levels in various stages of dissection with the maximum relief in the eastern part of the state. These plateau levels are in part uplifted peneplains, but more frequently cuestas formed on gently dipping formations notably resistant to erosion. Pleistocene glaciation did not greatly affect the topography of the state, and the various regional features reflect the effects of erosion of various outcropping rocks combined with uplift. Kentucky was essentially a low plain (peneplain) by the late Mesozoic. This was followed by regional uplift of the whole area. The uplift was much greater in the southeast and as a result the valleys could be cut much deeper there (hence the hills are higher).

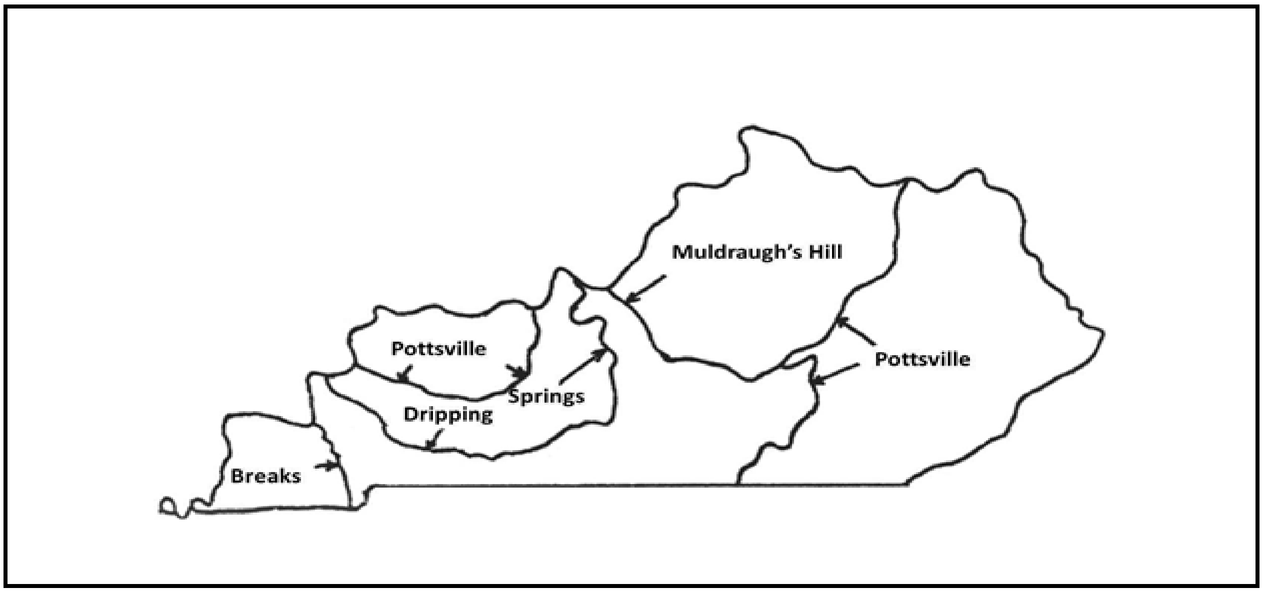


Fig. 39. A diagram of the escarpments separating the major physiographic regions in Kentucky.

Five major escarpments separate the eight physiographic regions of Kentucky. The eastern Pottsville escarpment separates the Mountains and Eastern Coalfields from the Eastern Pennyroyal and the Outer and Inner Bluegrass. The Muldraugh's Hill escarpment and the belt of Knobs separate the Pennyroyal region from the Outer Bluegrass and merge into the Pottsville escarpment in Rockcastle County. The Dripping Springs Escarpment encircles the sandstone and shale portion of Western Pennyroyal and separates it from the limestone of the Western Pennyroyal. The large caves characteristic of the Mammoth Cave area are generally located behind the Dripping Springs escarpment. The Pottsville escarpment is also represented, but not as a striking physiographic feature, in the western part of the state. It occurs in the sandstone and shale area of the Western Coalfield and Western Pennyroyal and represents the dividing line between the Pennsylvanian (Western Coalfield) and Mississippian Plateaus. The Land Between the Lakes comprises the area between the Cumberland and Tennessee Rivers and roughly separates the Purchase Region from the Western Pennyroyal Region. It is an area of steep, deeply washed slopes and resembles an escarpment area in general configuration.

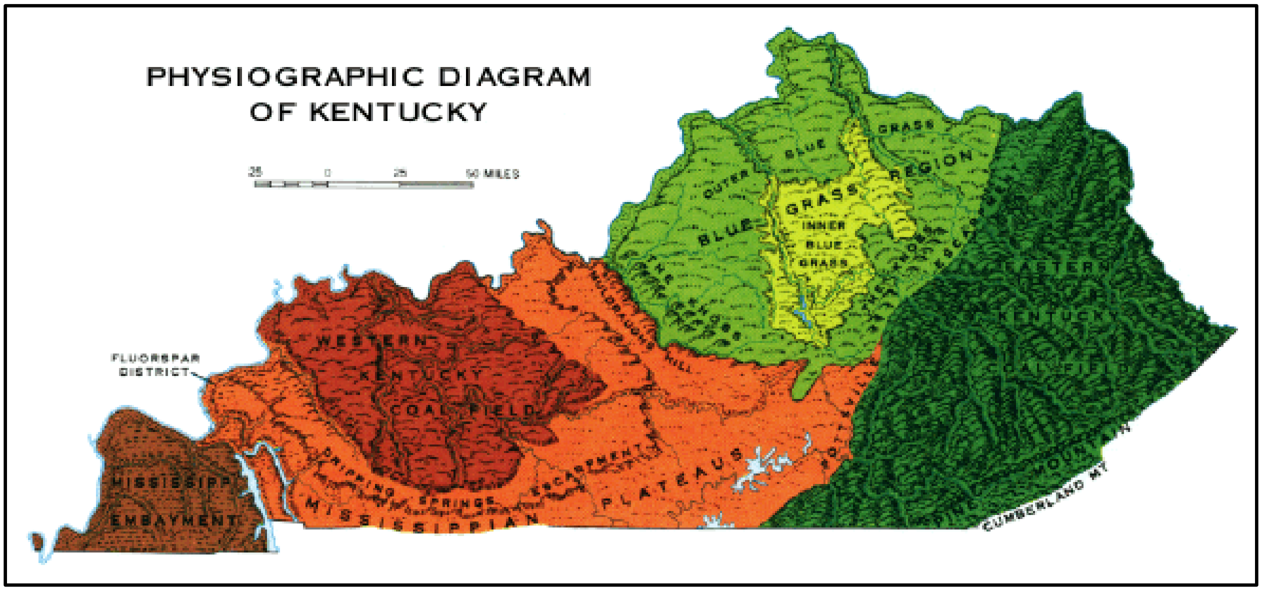


Fig. 40. Map of the major physiographic regions in Kentucky (uky.edu.)

FACTORS OF SOIL FORMATION

Soils form through natural physical, chemical, and biological processes influenced by the combined effects of parent material, climate, topography, organisms, and time. The developing soil reflects the integrated result of the variable influence of these five factors over the age of the soil. Each soil profile represents a record of the past history of the soil and the processes responsible for its formation. In Kentucky, the diversity of these factors has produced a variety of soils throughout the state. The relative uniformity of climate in the state has resulted in a rather uniform vegetative cover so many of the principal differences in the soils are due largely to greater diversity in parent material, topography and time.

Parent Materials

Kentucky's geologic materials, which provide the parent materials for mineral soils, are mainly sedimentary including limestones, sandstones, siltstones, conglomerates, shales, and clays. Except for a few sporadic intrusions of igneous rocks, they range in age from middle Ordovician (oldest) to the Quaternary (youngest) periods. A comparison of the geologic map and the physiographic and major soil association areas map shows a close relationship. This indicates that the shape of the land surface has been extensively influenced by the effects of weathering and erosion on the exposed geological formations.

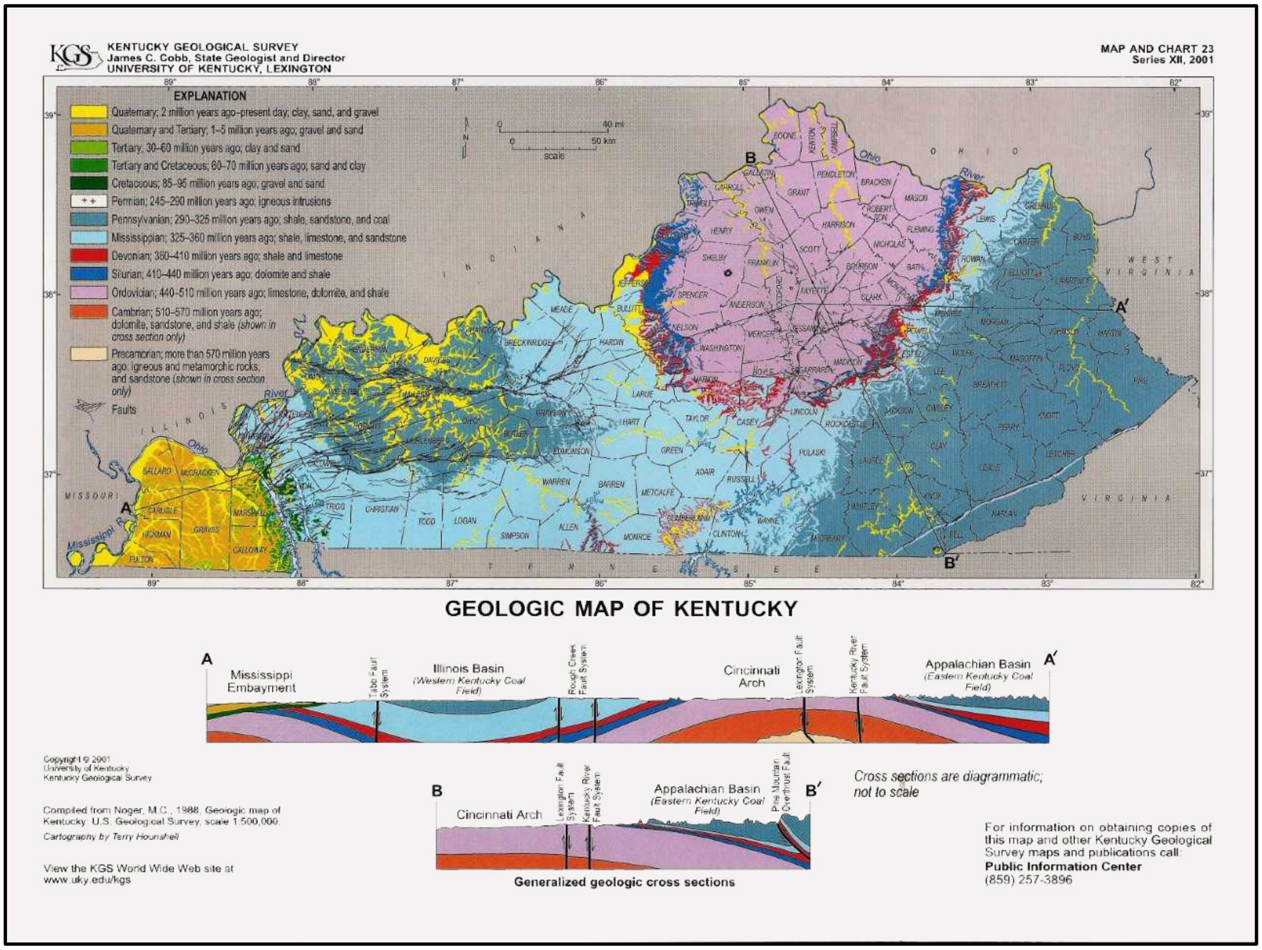


Fig. 41. Geologic Map of Kentucky (Kentucky Geological Survey)

Residuum

Residuum includes consolidated and partially weathered mineral materials accumulated by the disintegration of rocks in place. The nature of the rocks varies from place to place and may include igneous, sedimentary, and metamorphic types. Kentucky has numerous types of dominantly sedimentary residual materials including sandstones, siltstones and shales in the Eastern and Western Coalfields, limestones and calcareous shales in the Bluegrass and Pennyroyal, and coastal plain sediments in the Purchase and the Land between the Lakes. Residual parent materials are usually overlain by shallow soils on steeper slopes and deeper soils on flat and gently undulating topography. Consolidated (lithic) and partially weathered (paralithic) residual parent materials are usually impermeable or exhibit limited water and root penetration.

The oldest residual parent materials in Kentucky are exposed in the Inner Bluegrass Region. They are thick-bedded, hard, fossiliferous limestones and shales of Middle Ordovician age (450 million years ago). Several of these formations contain phosphatic rock inclusions which upon weathering lead to phosphorous-enriched soils. Most soils form on residuum with variable depth to bedrock. Differential dissolution of the variable purity limestones produces sinkholes, sinking streams, springs and caves. Cliffs along the Kentucky River Palisades reveal massive limestones and dolostones, which are the oldest strata exposed at the surface. Parent materials in the Outer Bluegrass are mainly interbedded limestones and shales of the late Ordovician period. The abundance of shales in the geological strata has contributed to greater erosion, more dissected topography, and shallower to bedrock soils than the Inner Bluegrass region.

Fig. 42. Lower Ordovician Limestone strata in the Inner Bluegrass (A. D. Karathanasis).

Fig. 43. Interbedded Upper Ordovician Limestone with shale in the Outer Bluegrass (USDA-NRCS).

Residual parent materials in the Knobs region include Silurian (430 million years ago) and Devonian (400 million years ago) age limestone, dolostone, and shale strata. Devonian shales are dark gray to black in color because they contain high amounts of fossilized organic carbon. Soils are generally shallow to lithic or paralithic contact and include considerable amounts of rock fragments. Some calcareous Silurian clay shales contain high amounts of expanding minerals, which form unstable soils with high-shrink-swell potential. Soils forming on black shales are red in color and high in acidity due to the presence of iron sulfide (pyrite) minerals.

In the Pennyroyal regions residual parent materials include Mississippian age (350 million years ago) limestones, shales and sandstones. Extensive karst features are common throughout the region. Underground dissolution of limestones capped by sandstone formations has formed a large network of caves, including the Mammoth Cave-Flint Ridge system, the world’s longest. Soils forming on limestones are generally deep, with red color and relatively high clay content.

Some may contain a significant amount of chert fragments. Thin to moderately thick layers of loess are evident on the upper solum of several soils in the region, particularly those in the western Pennyroyal. Sandstone and shale parent materials usually form shallower and yellower soils with lower clay content. Fragipans are common on several stable landscape positions.

Fig. 44. Devonian Black Shale over Mississippian Limestone in the Eastern Pennyroyal (A. D. Karathanasis).

Fig. 45. Mississippian Limestone with soil weathering cavities in the Western Pennyroyal (A. D. Karathanasis).

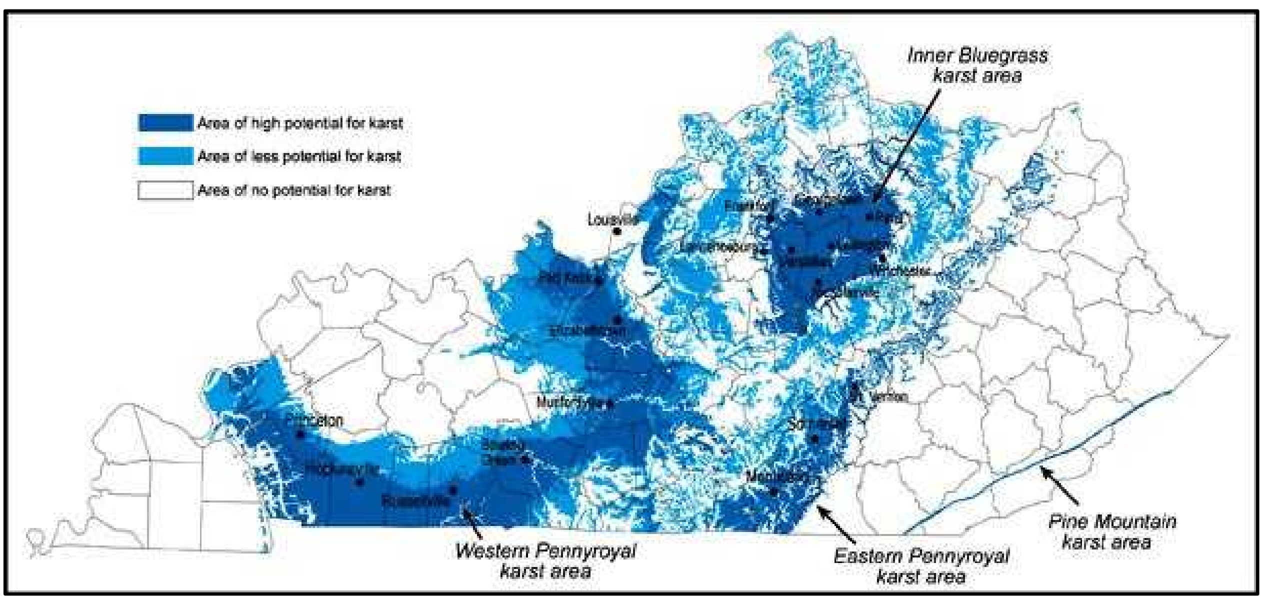


Fig. 46. Map of karst topography in Kentucky (KGS).

The sandstones, siltstones and shale residual parent materials underlying the Mountainous region as well as the Eastern and Western Coalfields are of Pennsylvanian age (320 million years ago). Differential erosion of thick, resistant sandstone strata and easily weatherable shales has had a profound effect on the highly dissected topography, particularly in the east. Uplifting of some of these areas has accentuated the relief of this region. Residual soils developing on sandstones are generally the shallowest in the state, while those on shale are moderately deep. Most contain considerable amounts of rock fragments. Significant outcrops of coal strata are also exposed in these regions. Extensive surface mining has drastically disturbed the original landscape and the soils throughout the area.

Fig 47. Pennsylvanian Sandstone over coal blooms in the Eastern Kentucky Coalfields (A. D. Karathanasis).

Loess

Loess is generally thought to be wind-blown, silty material (0.002-0.05 mm) derived from glacial outwash plains to the west about 20,000 to 100,000 years ago. The sediments are assigned to three Pleistocene formations, the Peoria (youngest) and the Roxana of Wisconsinan age, and the Loveland (oldest) of Illinoian age. The Peoria Loess is the thickest in the area (about 60 feet) with pale yellowish gray color, while the Roxana has reddish brown and the Loveland grayish orange hues. The thickest deposits are found in the Purchase region with the loess mantle gradually thinning eastward. Although loess deposition has been traced all the way to the Bluegrass region most of the soils there exhibit an upper mixing zone with the residual soil material rather than a distinct loess mantle. These materials originally had a high base saturation and an abundance of weatherable silicate minerals which upon dissolution induced the development of impermeable fragipan horizons. Loess derived soils are some of the most suitable for crop production in the state but they are highly erodible and the presence of fragipans may cause additional limitations. The majority of soils in Kentucky have developed in loess and residuum parent materials.

Fig. 48. Peoria Loess deposits in the Purchase (J. McIntosh).

Fig. 49. Peoria Loess over Coastal Plain sediments in the Purchase (A. D. Karathanasis).

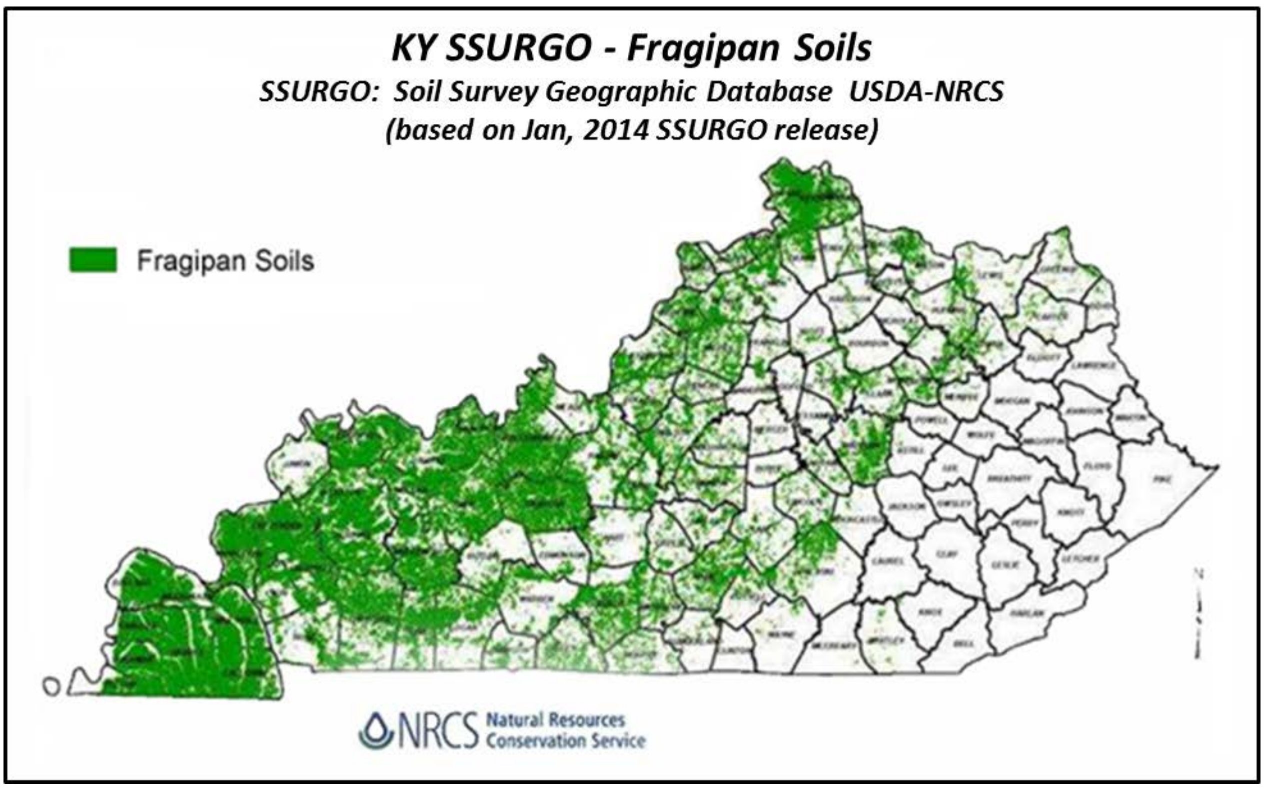


Fig. 50. Map showing areal extent of fragipan soils in Kentucky (USDA-NRCS).

Unconsolidated Coastal Plain Sediments

These parent materials include rocks and sediments of Late Cretaceous and Tertiary age (100-70 million years ago) that were deposited in both marine and non-marine environments of the Gulf Coastal Plains. The majority of them have not undergone significant cementation. The sediments are usually stratified and may include materials from boulders to clay size. These materials are exposed mainly in the Purchase and the Land Between the Lakes regions, where they are generally covered by loess, alluvium, and/or continental deposits of various thickness. Late Cretaceous sediments occur mostly along the Tennessee and Cumberland Rivers (Kentucky and Barkley Lakes) and overlie Mississippian age strata. They are composed of gravel with scattered lenses of sand, silt and clay, which are locally cross-bedded. The gravel consists of rounded chert and quartzite pebbles, generally less than 2 inches in diameter. Tertiary deposits occur mainly in the Purchase region and are dominated by sand, inter-bedded with variable amounts of silt, clay, and quartzite pebbles. These sediments may be covered with a loess mantle of variable thickness on stable landscapes, but on steeper slopes they may be exposed all the way to the surface. Soils most influenced by these sediments are most common in the rugged areas of the Land Between the Lakes. Many of these soils usually exhibit two parent materials including a loess-derived yellowish-brown, silty upper solum and a coarser textured, redder, lower depth that may contain considerable amounts of gravel.

Lacustrine Deposits

These deposits consist of material that has settled out of bodies of still water and are composed of very fine particles, mainly clay, silt and very fine sand. Lacustrine deposits are very well sorted, devoid of coarse particles, such as coarse sand or gravel and may exhibit thin stratification reflecting annual deposition of sediment. These deposits are usually exposed by elevation of old lakebeds or deeper incision of fluvial waters. They are of limited extent in Kentucky mostly associated with the Ohio River Valley southeast of Louisville (Big Bone Creek) and around the Owensboro area. Most of them are of Wisconsinan age and consist of laminated to thin-bedded, commonly calcareous, silty clay sediments in places inter-bedded with glacial outwash fine sands.

Colluvium

Colluvium refers to material deposited mainly by gravitational forces at the footslopes and lower slopes of hills or mountains. Soil slumps, landslides, or mudslides are typical examples of colluvial materials. In contrast to alluvium, these materials are poorly sorted with random mixing of different size particles from rock fragments to clay. Colluvium derived soils are more prominent in the mountainous and hilly regions of the state. On highly dissected areas of Eastern Kentucky colluvial soils may provide better options for agricultural and urban uses due to their greater thickness compared to residual soils.

Alluvium

Alluvium is transported and deposited by flowing water (rivers, streams or local wash). Alluvial materials occur throughout Kentucky along rivers and their tributaries. They are particularly extensive along the Ohio, Mississippi and Green rivers. Soils formed in alluvium are often adjacent to rivers or streams but not necessarily associated with present day flowing water systems. These materials are commonly found in floodplains, old or recent terraces, gentle footslopes and possibly in depressions (sinkholes). Alluvial sediments mostly of Holocene age, are typically well-sorted with evidence of stratification, particularly in recent deposits. They may contain cobbles, gravel, silt, and clay in various proportions. Alluvial soils are common throughout the state but the most agriculturally productive, following artificial drainage, occur along the Ohio and Mississippi rivers. The sediments may be of either a general or local origin. In eastern Kentucky they are usually coarser in texture, reflecting the parent materials in the region, while in the central and western parts of the state silty and clay deposits are more common.

Fig. 51. Old soil terrace of the Kentucky River (A. D. Karathanasis).

Fig. 52. Recent alluvium over old alluvium in the Western Coalfields (J. McIntosh).

Glacial Outwash

Very few soils along the Ohio River have formed from glacial outwash materials in Kentucky. Glacial outwash was deposited by water systems created from the melting of the glaciers along the Ohio River in the northern areas of Kentucky. The sediments are considered to be primarily of Wisconsinan age, especially in lower elevations. They are comprised of generally sorted gravel, sand, silt, and clay particles with their composition influenced by the energy of the depositional environment. The gravel consists mainly of chert, quartz, and carbonate, igneous or metamorphic rocks. Soils developed from glacial outwash are generally deep with loamy textures and common presence of glacial gravel. Sporadic glacial till erratics and drifts are also found in this area.

Topography

Kentucky has a varied topography with diverse landscapes encompassing the mountains of Appalachia, the gently sloping region of the Bluegrass, the classical karst terrain of the Mammoth Cave region, and the broad flood plains of the Mississippi. For the most part the topography of Kentucky is controlled by stream erosion with intensities reflecting the character of the underlying geological formations. Erosion on resistant rock formations may be expressed as mountains, hills, ridges, knobs, and cliffs; moderately weatherable materials may form upland plateaus or gently rolling landscapes; while soft shaley and clay formations may be deeply dissected and form valleys that are sometimes unusually wide for the size of the flowing stream. Multiple stages of geological erosion-deposition events have considerably modified Kentucky's landscapes. Elevations range from a low of 260 feet on the Mississippi River to 4145 feet on Black Mountain at the Kentucky-Virginia border. A more detailed discussion of the topography-geology effects on the state's landforms has been provided in the Physiography section.

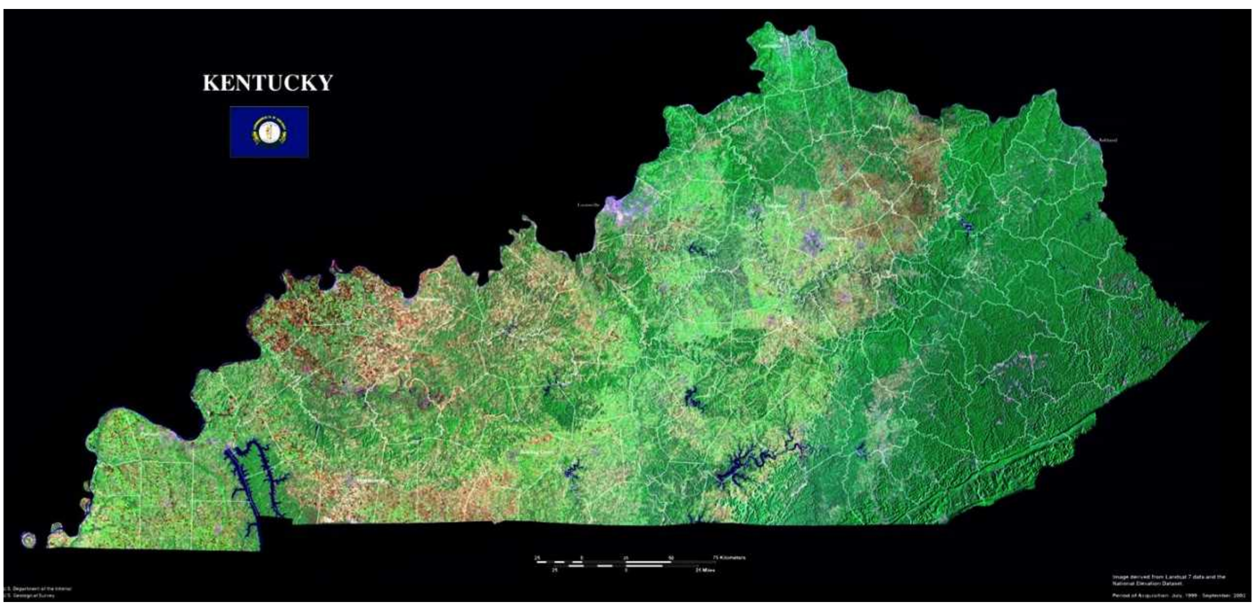


Fig. 53. A generalized Land Use map of Kentucky indicating urban, cropland, and forestland areas as affected by topography (kygeonet.ky.gov).

Fig. 54. Mountainous landscape in Eastern Kentucky (A. D. Karathanasis).

Fig. 55. Knobs landscape (USDA-NRCS).

On sloping landscapes water infiltration is limited and runoff is high. Slope gradient controls the speed of water runoff and the amount of sediment carried down-slope. On the steeper slopes of eastern Kentucky geologic erosion tends to keep pace with soil formation and a continuous youthful condition exists. Therefore, soils are shallow because they erode not only by water runoff but by soil actually creeping or rapidly sliding downhill. These soils usually contain a significant amount of rock fragments. The effect of slope aspect is also evident in these soils through its micro-climatic influence. South- facing slopes, which are generally drier and warmer, support a somewhat different native vegetation than moister and cooler north- facing slopes. South- facing slopes also tend to "warm up" earlier in the spring.

Fig. 56. Hilly landscape in the Outer Bluegrass (A. D. Karathanasis).

Fig. 57. Inner Bluegrass landscape with soybean fields (Chad Lee).

Fig. 58. Gently rolling hill landscape in the the Eastern Pennyroyal (USDA-NRCS).

Fig. 59. Karst Landscape with sinkholes in Western Pennyroyal (A. D. Karathanasis).

On the more gentle slopes of the Bluegrass and the Pennyroyal regions thicker and more mature soils are common, as they tend to retain the moisture necessary for active profile development, and experience smaller losses by erosion. However, the silty surface of many of these soils may be prone to higher erosion indices, and require proper conservation management practices on crop lands. Accelerated erosion generally leads to accumulation of local alluvial soil materials washed from surrounding slopes onto adjacent flat and depressed areas. Addition of relatively large amounts of new materials to the surface tends to surpass the pace of horizon differentiation so that an abnormally thick surface soil may be formed at the expense of complete profile development. Nearly level valley floors accumulate new materials during periodic flooding events and show distinct stratification patterns with little or no profile development. Low gradient and flat areas of western Kentucky with a relatively thick loess mantle exhibit moderate development, but they have a tendency to form fragipan or hard-pan horizons that restrict water and root penetration.

Fig. 60. River terrace and floodplain landscape in the Eastern Pennyroyal (USDA-NRCS).

Fig. 61. Flat landscape in the Purchase (C. Matocha).

Climate

Kentucky has a moderate, relatively humid climate with abundant rainfall. Even though the climate of Kentucky is generally considered to be rather uniform, from the viewpoint of soil formation, the southern and south west regions are slightly warmer than the northern and mountainous areas in the east, as indicated by the thermic-mesic temperature regime distinction. In spite of this temperature variation, there has been sufficient rainfall in Kentucky for a long enough period of time to cause significant leaching and formation of acidic conditions, even in soils derived from limestone materials. Therefore, under similar vegetative cover, many of the principal differences in our soils are due to a large extent to parent material, topography, and time effects. However, the close interrelationship of climate and vegetation is also an important factor in soil formation in upland and mountainous regions.

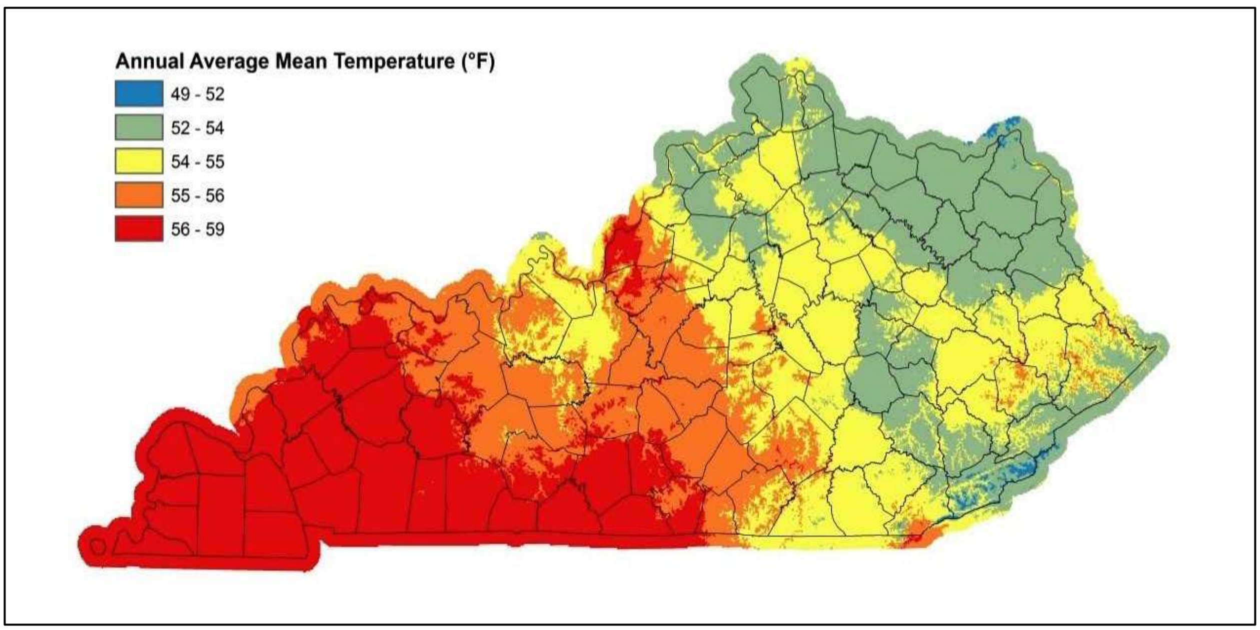


Fig. 62. Mean annual temperature map of Kentucky (prism.oregonstate.edu).

Kentucky's temperate climate is well suited to agriculture and other human activities. The climatic elements of sunlight, heat, moisture, and winds are all in moderation without prolonged extremes. Rainfall is abundant and fairly regular throughout the year, usually as short showers. Heavy snowfalls are infrequent. The seasons differ markedly, yet warm to cool weather prevails with extremes of heat and cold occurring only in short spells.

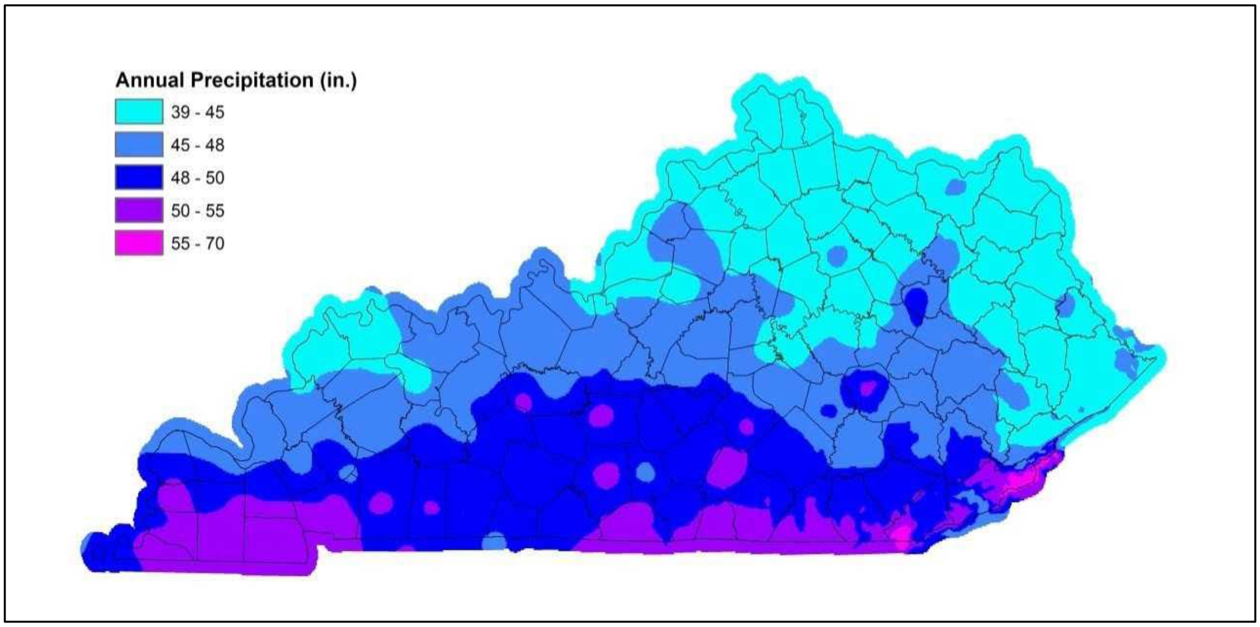


Fig. 63. Kentucky mean annual precipitation map (prism.oregonstate.edu).

Mean annual temperature ranges from 53^0 F in the northeast to 59^0 F in the southwest but there is significant seasonal variation in temperature. Summer days are typically sunny, warm and humid. Most areas of the state receive more than 60 percent of available sunshine during summer. The average daily high temperature for July increases from about 86^0 F in the east to 90^0 F in the west. High temperatures may exceed 90^0 F for an average of 20 days per year in the north and east and 40 or more days in the south and west. Winters are rarely harsh. In January average daily high temperatures increase from 38^0 F in the north to 44^0 F in the south. Cloudy skies are more frequent in the winter, thus most areas receive nearly 40 percent of available sunshine. Temperatures dip below 0^0 F for an average of about five days in the north and two days in the south. Spring and fall are generally pleasant seasons, though temperatures can change dramatically with the passage of frontal systems. The diurnal temperature range is about 20^0 F during the summer and winter but increases to near 25^0 F during the spring and fall, when warm days and cool nights are prevalent.

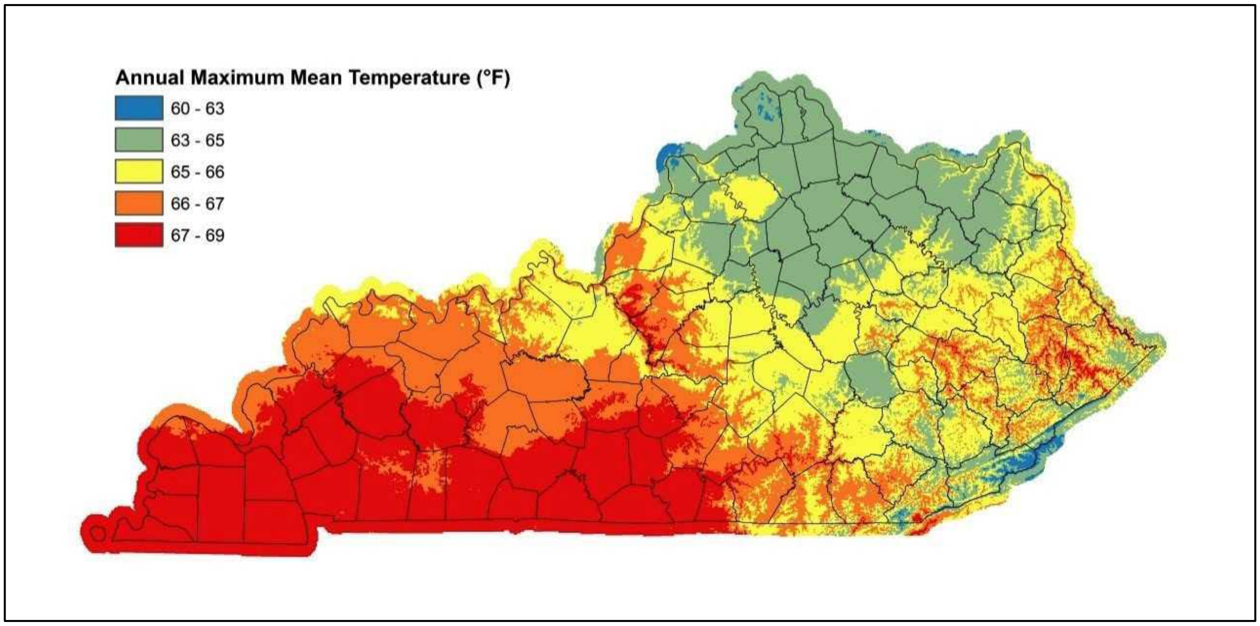


Fig. 64. Mean annual maximum temperature map of Kentucky (prism.oregonstate.edu).

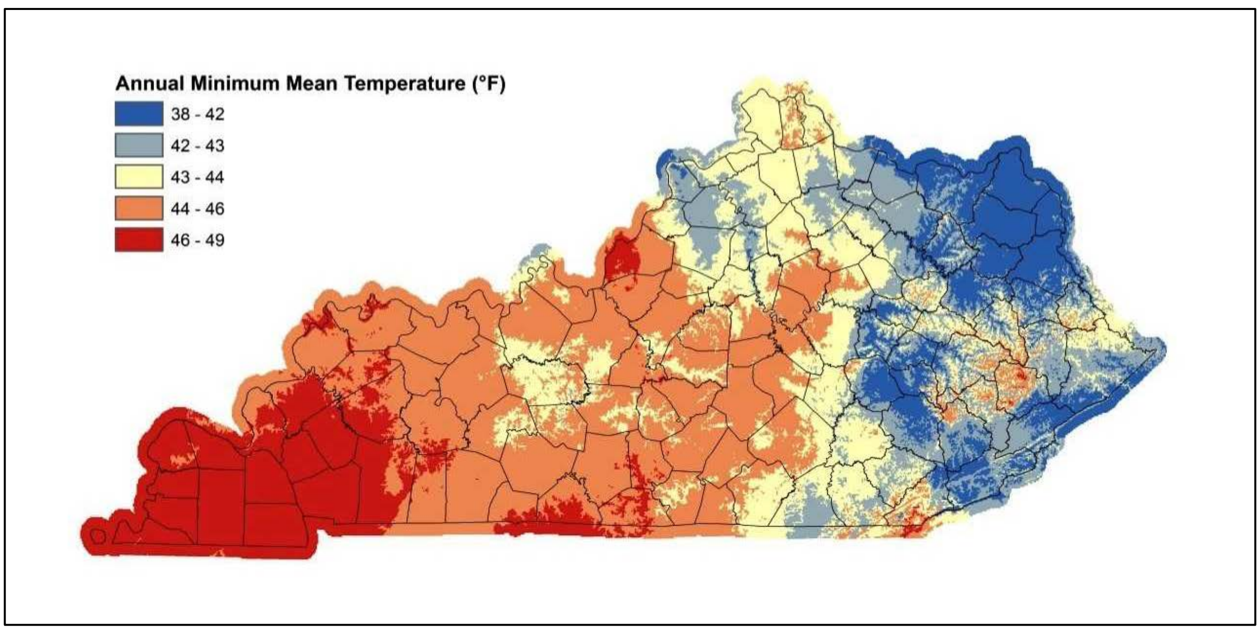


Fig. 65. Mean annual minimum temperature map of Kentucky (prism.oregonstate.edu).

Kentucky's growing season is fairly long, varying from 165 days in the northeast to 200 days in the southwest, but the average can vary with local topography. The average date of the last spring freeze ranges from early April in the southwest to early May in the northeast. Meanwhile, the average date of the first fall freeze extends from early October in the northeast to late October in the southwest.

Average annual precipitation ranges from 42 inches in the north to 52 inches in the south. Much of the variability is due to a strong precipitation gradient during the winter season. Summer precipitation patterns are less pronounced. Fall is normally Kentucky's dry season, while the spring season is typically the wettest. But precipitation is well distributed throughout the year. Thunderstorms are responsible for much of the rainfall during summer, and they often bring intense rainfall that may be highly localized. Rainfall intensities generally increase towards the southwest. Rates exceeding one inch per hour are not unusual, and 24-hour totals of five inches or more occur an average of about one in ten years at a given location. Seasonal amounts average from nearly 10 inches in the south to more than 20 inches in the north. Amounts are highly variable from year to year. Northern areas rarely receive less than 10 inches of snow and occasionally as much as 40 inches or more. Snow-cover seldom persists for more than a week in the south or more than two weeks in the north.

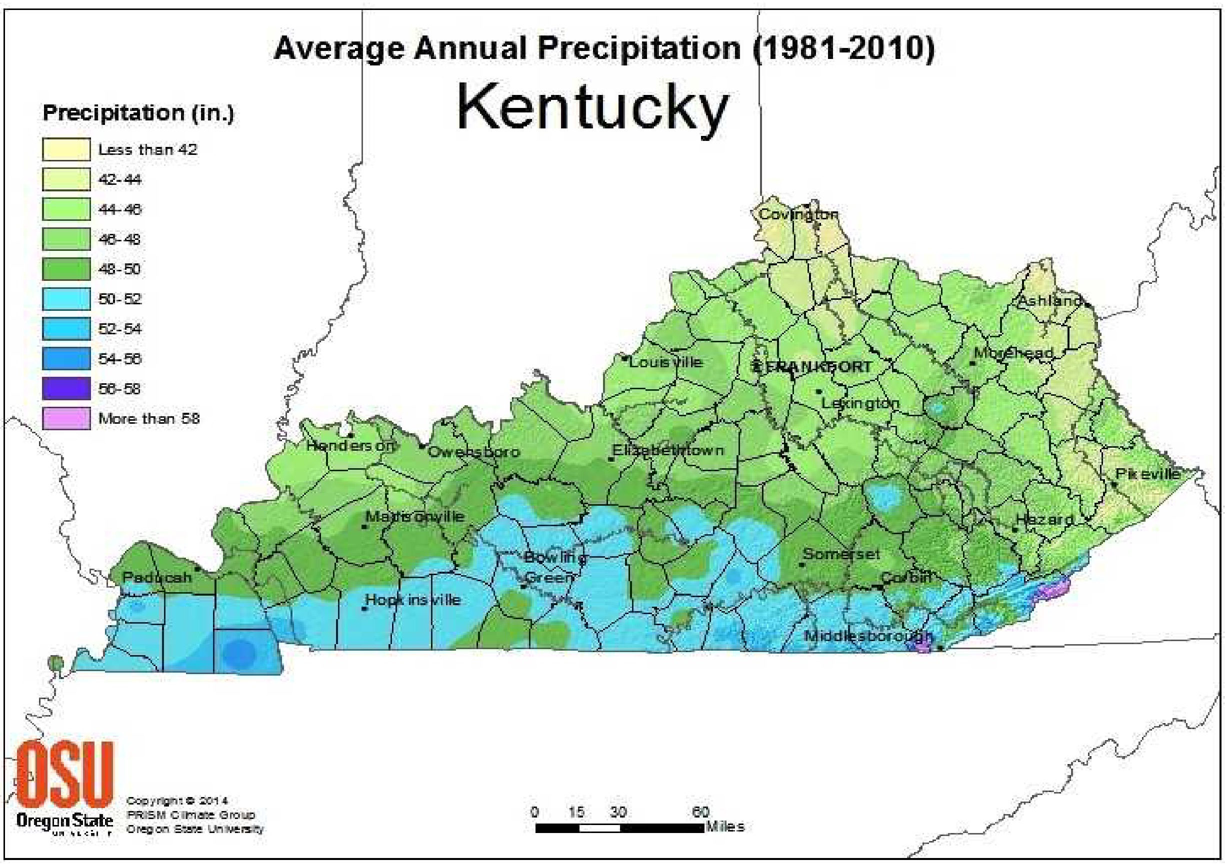


Fig. 66. Mean annual precipitation map of Kentucky for the 1981-2010 period (prism.oregonstate.edu).

Flooding can be widespread or highly localized across Kentucky and is most common in the winter and spring seasons when moisture-laden frontal systems can drop heavy rains over large areas. Flash floods can occur anywhere across the state, but they are a greater threat in areas of rough terrain and narrow stream valleys. Droughts are a recurrent feature of Kentucky's climate, occurring at an average once every ten years and causing considerable damage to crop productivity.

Organisms

Prior to European settlement, much of Kentucky was covered with forest. Soils that developed under forest cover generally have a rather thin, dark surface layer lying over a strongly leached, lighter subsurface horizon. Upon cultivation the surface layer is low in organic matter content and relatively infertile. Because broadleaf trees typically return more bases to the soil surface by leaf fall, soils of broadleaf forests usually have higher surface pH than soils of evergreen forests. Grass dominated ecosystems such as the savanna – like areas of the Inner Bluegrass and prairie communities in the Big Barrens region also existed. Grasses promote the development of soils having thick, dark surface horizons with relatively high organic matter content lying over less leached subsurface horizons. Even after cultivation these soils tend to have higher organic matter content and fertility than soils that developed under forest vegetation. The soil properties also reflect the grass species present. Deep – rooted grasses typically produce a much deeper, darker profile than do shallow – rooted species, because the seasonal decay of grass roots contributes to soil organic matter content. Thus, knowledge of Kentucky's original vegetation provides insight in regard to some soil properties.

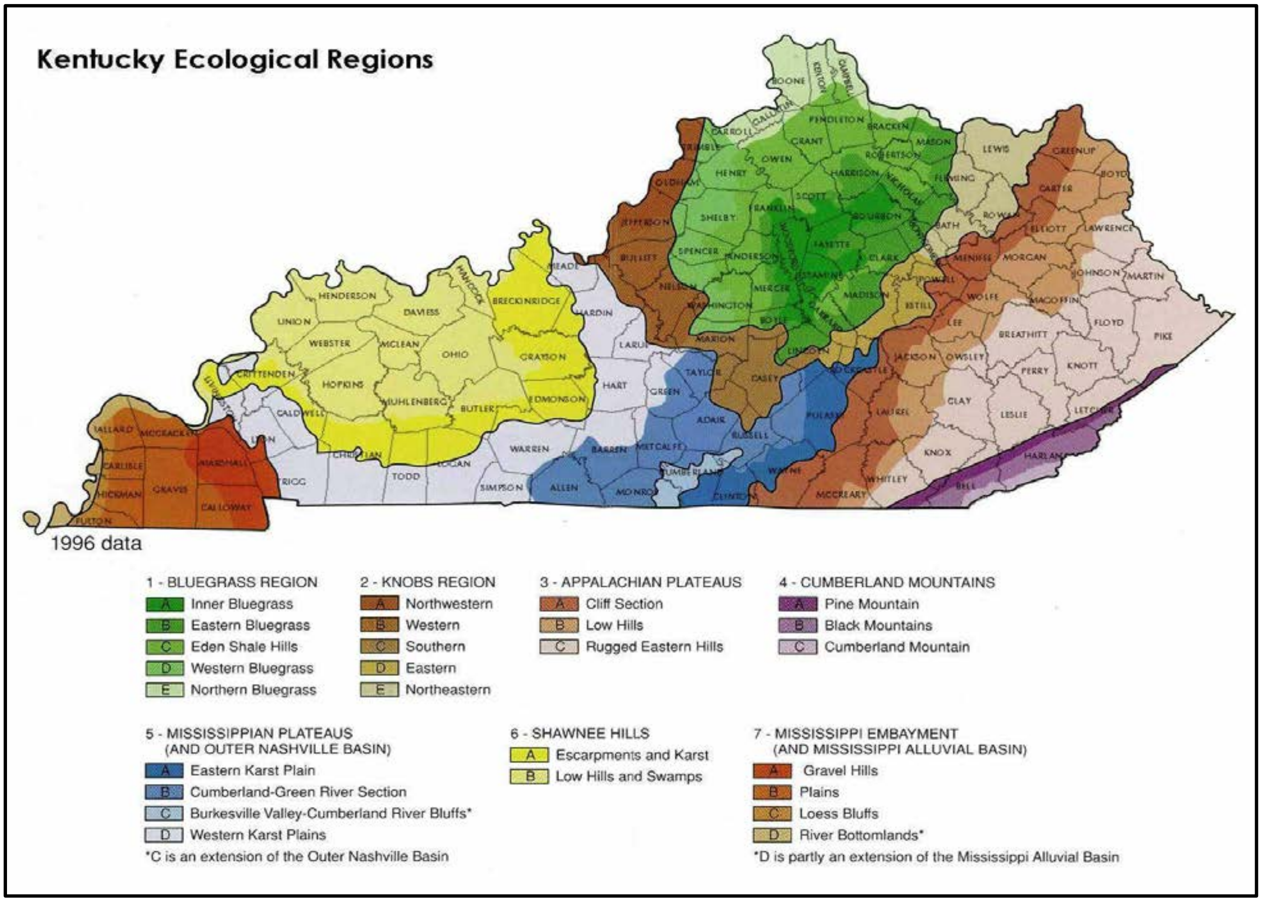


Fig. 67. Map of ecological regions in Kentucky (Ulack et al.; 1998).

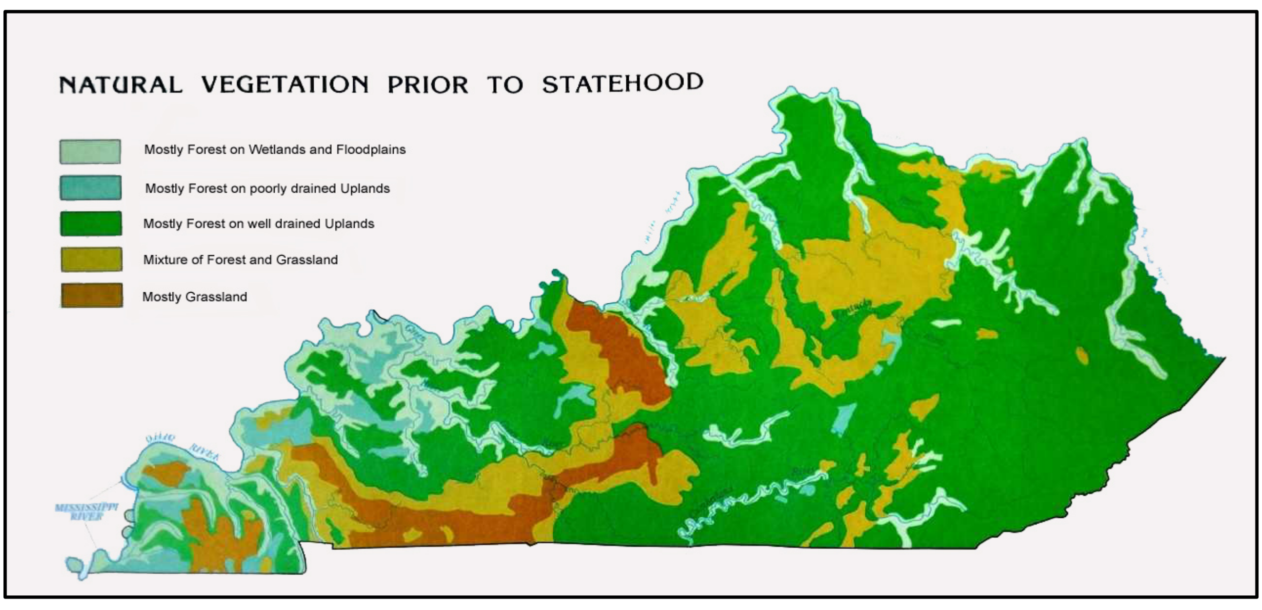


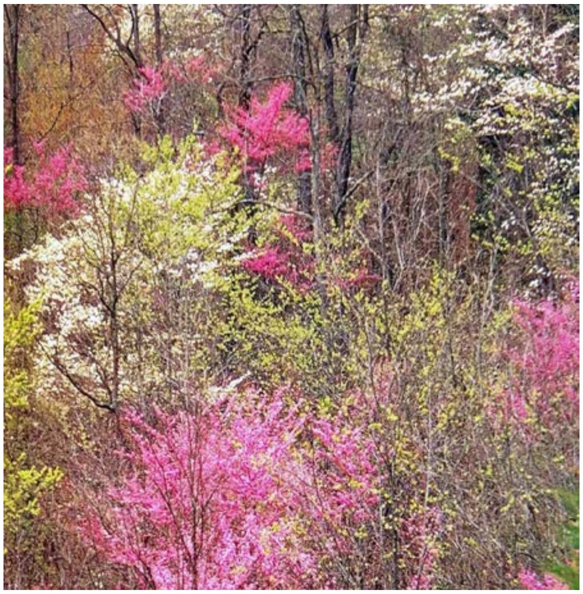
Fig. 68. Map of natural vegetation in Kentucky before statehood (Ulack et al.; 1998).

In eastern Kentucky, mixed mesophytic forest, characterized by rich species diversity, covers the mountains and Cumberland Plateau. Dominant trees include yellow poplar, oaks, hickories, black walnut, magnolias, eastern hemlock, Virginia pine, American beech and sugar maple. Understory species include rhododendron, mountain laurel, dogwood, redbud and diverse herbaceous species. After extensive logging, large areas in Daniel Boone National Forest, state forests and on private lands are re-developing into mature second-growth forests. Upland forests elsewhere in Kentucky are primarily oak-hickory communities comprised of a mixture of oaks, hickories, elm, black cherry, black walnut and ash.

Fig. 69. Mixed hardwoods is the prevalent vegetation in the Mountains of Eastern Kentucky (A. D. Karathanasis).

Fig. 70. A savanna- type vegetation covered most of the Bluegrass and Pennyroyal Regions before settlement (T. Barnes).

The pre-settlement vegetation of the Inner Bluegrass of central Kentucky featured an ash-oak savanna populated by bur oak, sumard oak, blue ash, white ash, and shellbark hickory. The open fields among these large trees supported stands of wild cane, native grasses, and wildflowers which have largely been replaced by domestic pasture grasses. The region is now widely known for thoroughbred farms, but beef cattle farms are also prevalent. The Big Barrens area of south central Kentucky was dominated by prairie species such as switch grass, little bluestem, and perennial herbs. Most of the land is now used for agriculture, and the native vegetation persists at only a few scattered sites.



Figs. 71 and 72. Kentucky's diverse assortment of native plants includes these blooming trees and wildflowers (T. Barnes).

Kentucky's extant wetlands are largely found in the western region where low topographic relief has promoted floodplain development and the growth of riparian forests and swamps. Here, fragipan soils with poor drainage also contribute to wetland development. The Purchase region, bounded by the Ohio and Mississippi Rivers, is home to bald cypress wetlands and bottomland hardwoods typified by cherrybark, overcup and swamp chestnut oaks as well as willow, silver maple, and sweetgum. Understory species here include buttonbush, and a variety of rushes and sedges.

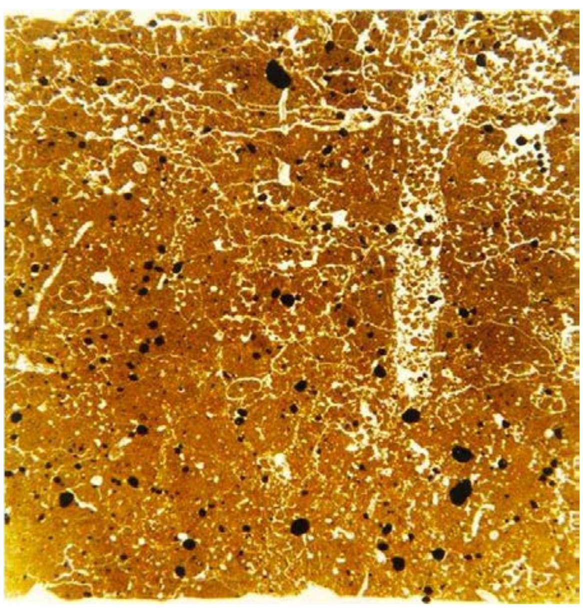


Fig. 73. Earthworm channels in the subsoil of a Bluegrass soil improve significantly soil structure and drainage (A. D. Karathanasis).


Fig. 74. Irregular grey streaks in a fragipan soil caused by decomposed tree roots (A. D. Karathanasis).

Kentucky's once depleted large mammal populations are now rebounding toward their earlier abundance. White tailed deer are plentiful again throughout the commonwealth. Coyotes have expanded their range and migrated into much of Kentucky. Elk and bison have been re-introduced to suitable habitats. Black bears are repopulating forested areas of eastern and southern Kentucky. Small mammals such as red and gray foxes, beaver, fox and gray squirrels, skunk, opossum, rabbit, raccoon, woodchuck, and species of bats, mice and voles are present throughout the state. More than 300 avian species have been recorded in Kentucky. Resident birds include the blue jay, cardinal, crow, robin, Carolina chickadee, tufted titmouse, Canada goose, mallard, great blue heron, wild turkey and multiple species of sparrows, woodpeckers, owls and hawks. The western Kentucky wetlands are within the Mississippi flyway and seasonally support immense flocks of migrating waterfowl.

Figs. 75 and 76. Kentucky has an abundance of wildlife including wild turkeys and white tail deer (A. D. Karathanasis).

Kentucky herpeto-fauna includes venomous snakes (copperhead, timber rattlesnake, and in the western swamps the cottonmouth) and a number of non-poisonous snakes such as the king, black, black racer, rough green, rat and bull snakes. Other Kentucky reptiles include snapping turtles, soft shell turtles, the eastern box turtle, skinks and the northern fence lizard. A rich amphibian fauna includes 22 species of frogs and toads and 35 salamander species.
Kentucky surface waters are home to 244 species of native fishes (including minnows, darters, bass, sunfish, and catfish) and countless macro-invertebrates. The Cumberland, Tennessee and Green Rivers in particular support diverse populations of Unionid mussels, many of which are endangered. These unique mussel populations developed in streams where limestone bedrock dissolution supports the soluble calcium concentrations in the water column needed for shell formation.

Time

The soils of Kentucky range from very young to old or mature. A soil is considered to be old or mature when it has been in place for sufficient time to approach equilibrium with its environment. In general, the upland soils of the Bluegrass and Pennyroyal regions that are on gentle and moderate topography are mature, as soil formation has kept pace with geologic weathering. Soils developing in the Purchase region of Kentucky are considered relatively moderately young as their parent materials have been deposited during the last 20-50 thousand years. Recent alluvial deposits have not been affected by climate and vegetation long enough to develop well defined genetic soil horizons. Therefore, soils on floodplains are considered the youngest and occur throughout the state. Soils on terraces may be somewhat older and generally have developed some horizonation. The soils on old high terraces, such as on the high hills along the Kentucky River, have been so altered by climate and vegetation that they are considered relatively mature. Soils that occur on steep slopes, particularly in the eastern mountainous region have their materials constantly renewed by weathering and removed by normal geologic erosion and have weak profile development. They are considered to be relatively young.

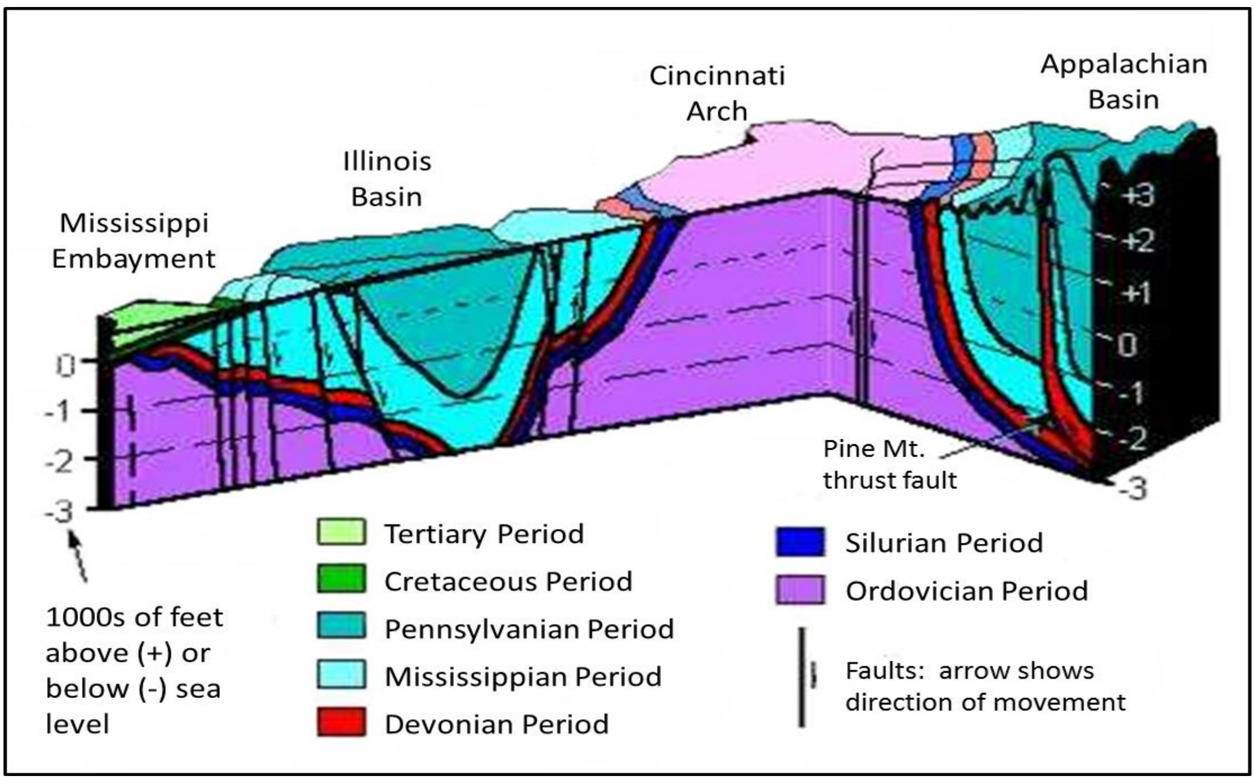


Fig. 77. A block diagram of Kentucky's geology (Kentucky Geological Survey).

Many soils in Kentucky exhibit age and/or lithological discontinuities, where a young soil overlies an older soil formed at an earlier time from different parent materials. A significant number of soils in the western part of the state consist of a young, loess -derived soil overlying an older soil developed from coastal plain sediments or limestone parent materials and exhibit contrasting textural and color properties. Floodplains, terraces, sinkholes, and footslopes around the state may also have younger soils developing over old soil materials as a result of more recent depositional sedimentation or pedi-sedimentation processes. Recent soil dating information suggests that as much as 2 feet of new soil may have formed in sinkhole landscapes in karst regions of the state as a result of accelerated erosion due to conversion to agriculture during the last 300 years.

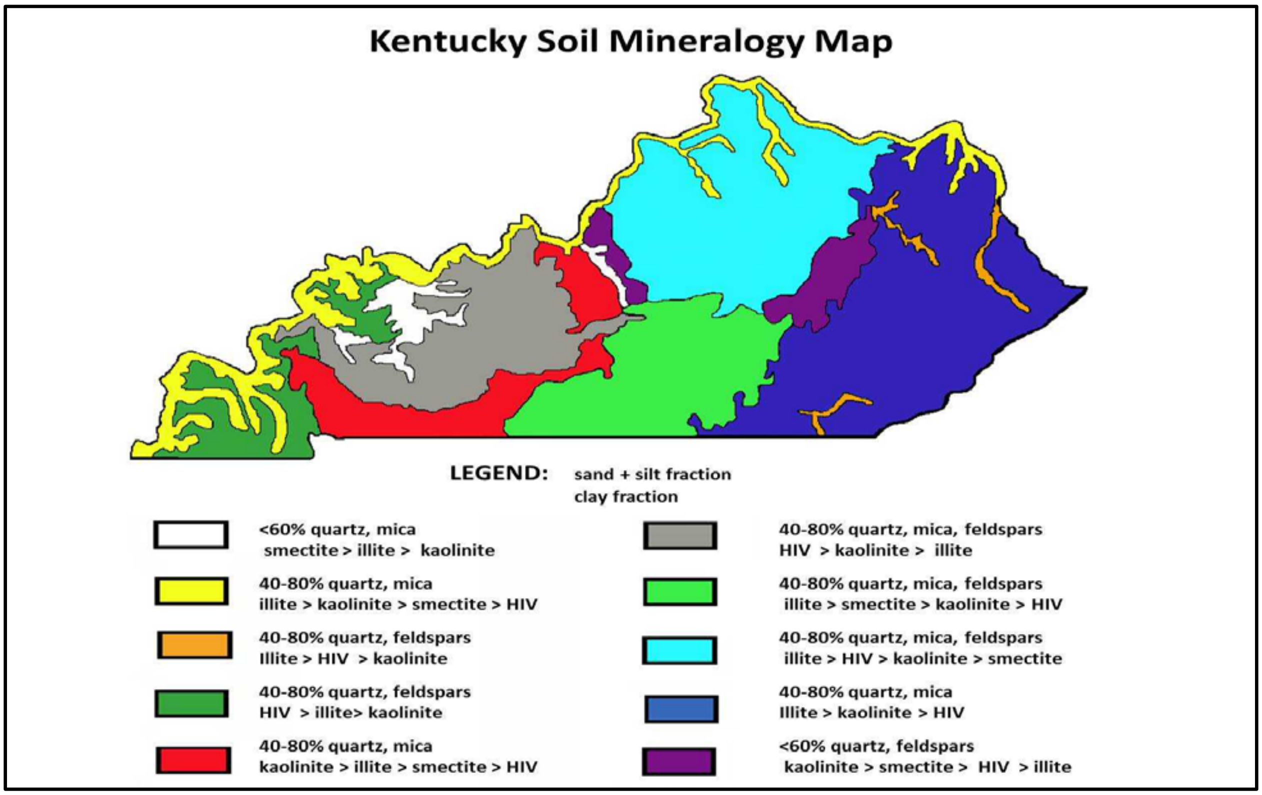


Fig. 78. A Soil Mineralogy map of Kentucky (A. D. Karathanasis).

SOIL ORDERS

Soil Taxonomy is the official classification system used in the U. S. to group soils with similar properties. The system is based on the evaluation of soil morphological, physical, chemical, and mineralogical characteristics, as well as differences in soil forming factors, diagnostic horizons and moisture and temperature regimes. Soil Taxonomy recognizes six hierarchical soil categories from the broadest to the narrowest, including Order, Suborder, Great Group, Subgroup, Family, and Series. Soils are first assigned to one of the 12 orders based on properties reflective of soil forming processes and extent of development in conjunction with moisture and temperature regimes. As additional soil properties and pedon characteristics are considered, soils are classified into the lower, more specific categories. As the number of diagnostic soil characteristics increases with each lower category level, the population of the included soils increases as well.

Kentucky's great diversity in topography and parent materials has produced a variety of soils covering six orders of the Soil Taxonomy, including Alfisols (formative element: alf), Ultisols (formative element: ult), Inceptisols (formative element: ept), Entisols (formative element: ent), Mollisols (formative element: oll), and Vertisols (formative element: ert). Overall, there are 330 soil series mapped in Kentucky.

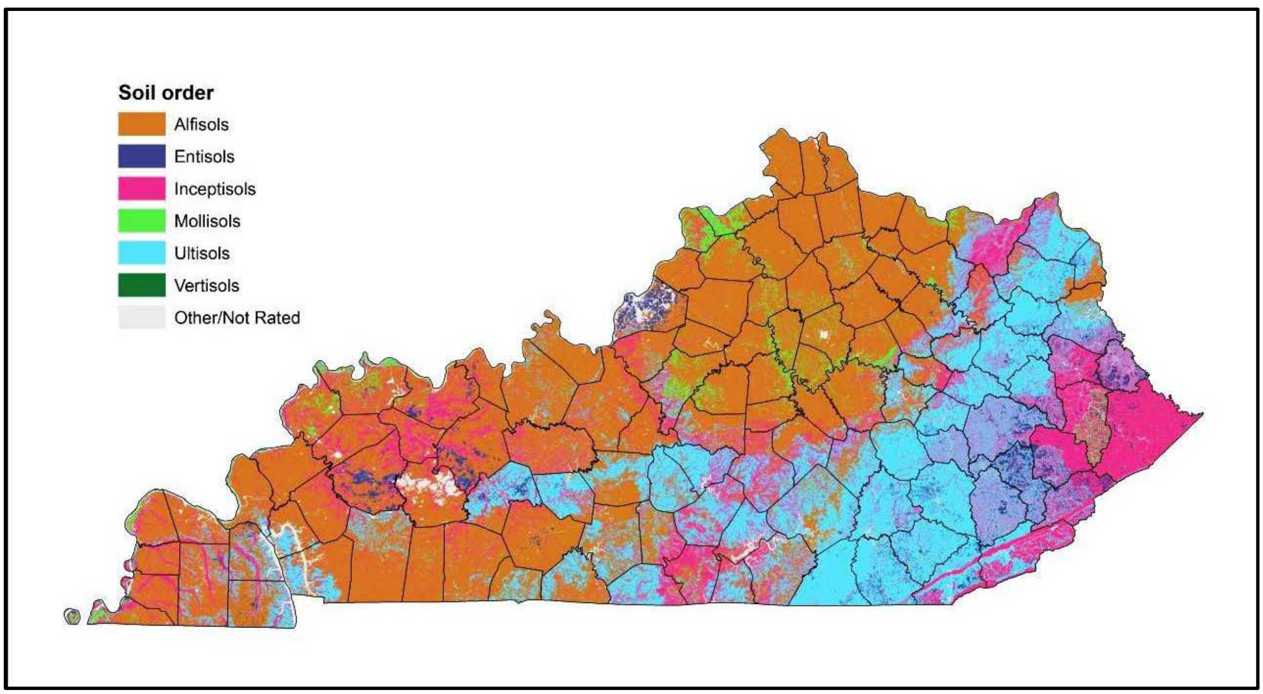


Fig. 79. Kentucky Soil Orders map (USDA-NRCS).

Alfisols

Alfisols constitute the dominant soil order mapped in Kentucky. There are 111 soil series mapped as Alfisols in the state, comprising about 45% of the mapped soil area. The extensive limestone formations in Kentucky and the temperate humid climate are conducive to Alfisol formation. They are moderately leached, relatively deep soils, characterized by a sub-surface accumulation of silicate clays (Bt, argillic horizons) and moderate to high base saturation. Most Kentucky Alfisols lack depleted sub-surface E horizons but several in the western part of the state exhibit fragipans. They are considered the most productive soils in Kentucky, but they can be highly susceptible to erosion if the surface is silty and left unprotected without a residue cover. Kentucky was a pioneer state in the development and implementation of no-till and conservation till management for the protection of these soils.

Fig. 80. Typic Hapludalf from the Eastern Pennyroyal (USDA-NRCS).

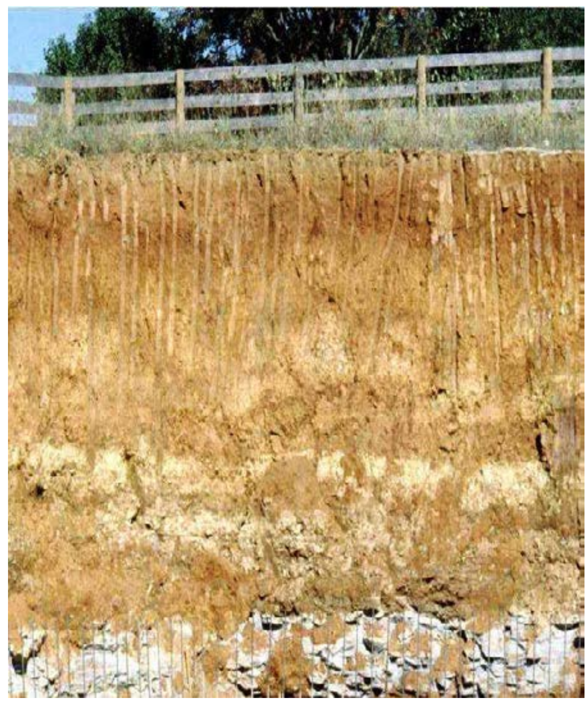


Fig 81. Typic Paleudalf formed from Ordovician Limestone in the Inner Bluegrass (A.D. Karathanasis).


Fig. 82. Aeric Epiaqualf on a toeslope in the Outer Bluegrass (USDA-NRCS).


Fig. 83. Oxyaquic Fragiudalf from the Pennyroyal (USDA-NRCS).

Ultisols

There are 77 soil series mapped as Ultisols in the state, making up about 25% of the mapped soil area. They are generally considered to be older soils and more weathered than Alfisols, although their age and development may be misinterpreted if they form on low base parent materials. This indeed may be the case for some Ultisols in the eastern and the Land Between the Lakes regions of Kentucky where the parent materials are sandstones, siltstones, acid shales, or coastal plain sediments. Soils in the south central part of the state are more representative of the Ultisol model showing significant base leaching, and redder hues than Alfisols. Most have thick argillic horizons and even some thin E horizons. Most Ultisols in eastern Kentucky occur on highly dissected areas and are used mostly for timber and hay production. Many Ultisols in the south central region are used for crop production, but may require liming and fertilization.

Fig. 84. Aquic Hapludult from the Knobs (USDA-NRCS).

Fig. 85. Typic Hapludult in the Eastern Coalfields (A.D. Karathanasis).

Fig. 86. Typic Fragiudult from the Eastern Pennyroyal (A.D. Karathanasis).

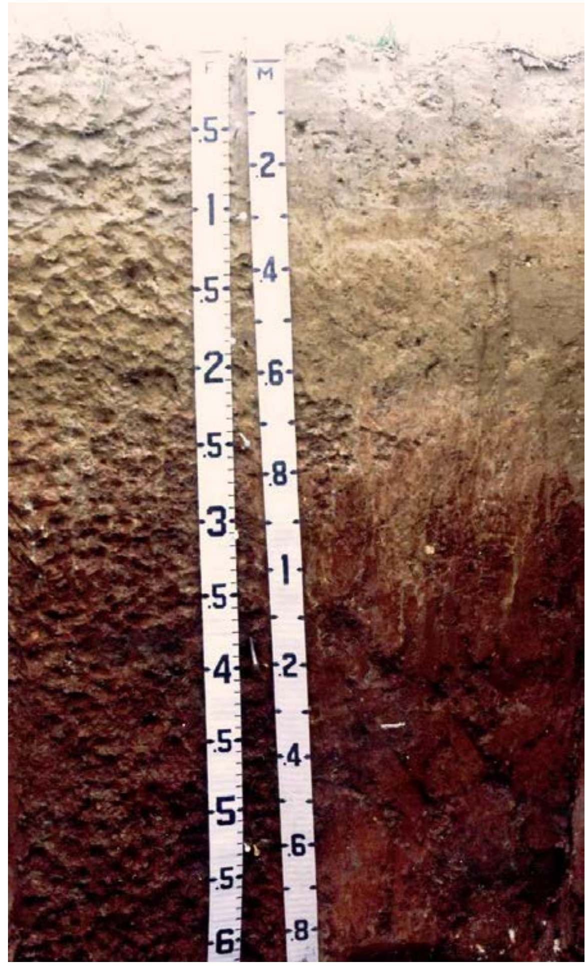


Fig. 87. Oxyaquic Paleudult from the Eastern Pennyroyal (USDA-NRCS).

Inceptisols

Inceptisols occupy about 20% of the mapped area in Kentucky. There are 89 soil series mapped overall. They are widely distributed throughout Kentucky. They are often present on landscapes where the process of soil development is slowed either by relatively steep gradients, young geomorphic surfaces, or resistant parent materials. This type of Inceptisols is usually found in the eastern and western coalfield regions of the state. Inceptisols are also typical on broad floodplains where flooding and alluvial depositions are not as frequent or persistent water saturation conditions exist. Inceptisols exhibit minimal horizon development (Bw, Bg, cambic). Land use varies considerably and productivity depends on soil characteristics and management.

Fig. 88. Typic Dystrudept from the eastern Coalfields (A.D. Karathanasis).

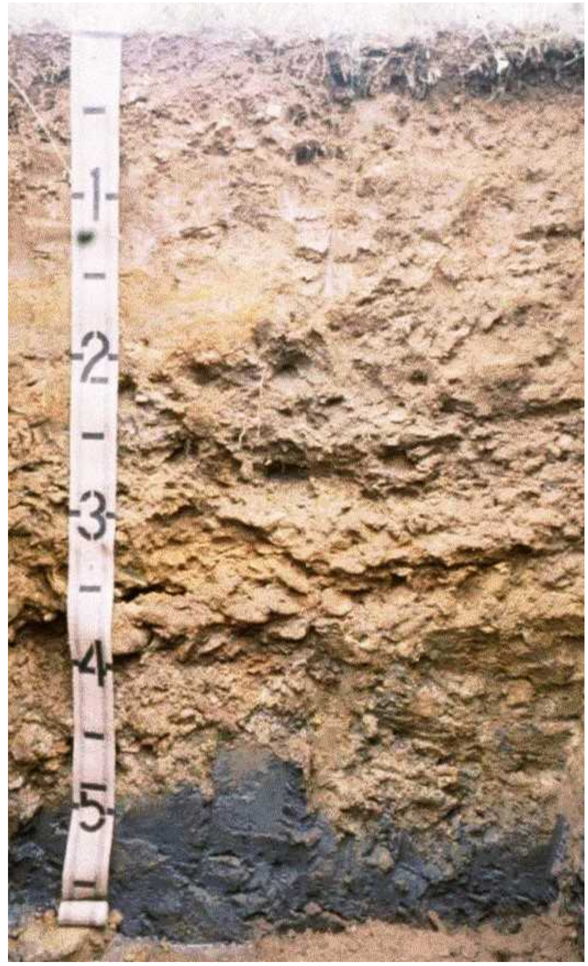


Fig. 89. Fluventic Eutrudept from the eastern Coalfields (A.D. Karathanasis).

Fig. 90. Fluvaquentic Eutrudept on a stream terrace in the Purchase (J. McIntosh).

Fig. 91. Fluventic Endoaquept on a floodplain in the Eastern Pennyroyal (A.D. Karathanasis).

Mollisols

There are 24 soil series mapped as Mollisols in Kentucky, representing about 3% of the mapped area. They are characterized by thick dark brown to nearly black color surfaces resulting from accumulation of organic matter. Their subsoil is high in bases. Many of Kentucky's Mollisols formed in old prairie landscapes (barrens) but accelerated erosion due to modern agricultural practices has converted a significant number of them to Alfisols. Some Mollisols in Kentucky have formed as a result of depositional processes involving alluvial, colluvial or local alluvial conditions. Therefore, they generally occur on stream terraces, footslopes, or depressional areas, respectively. The high organic matter content and base saturation of these soils make them naturally fertile and well suited for crop production. However, due to the nature of their landscape position, some of them may be too wet and may require artificial drainage.

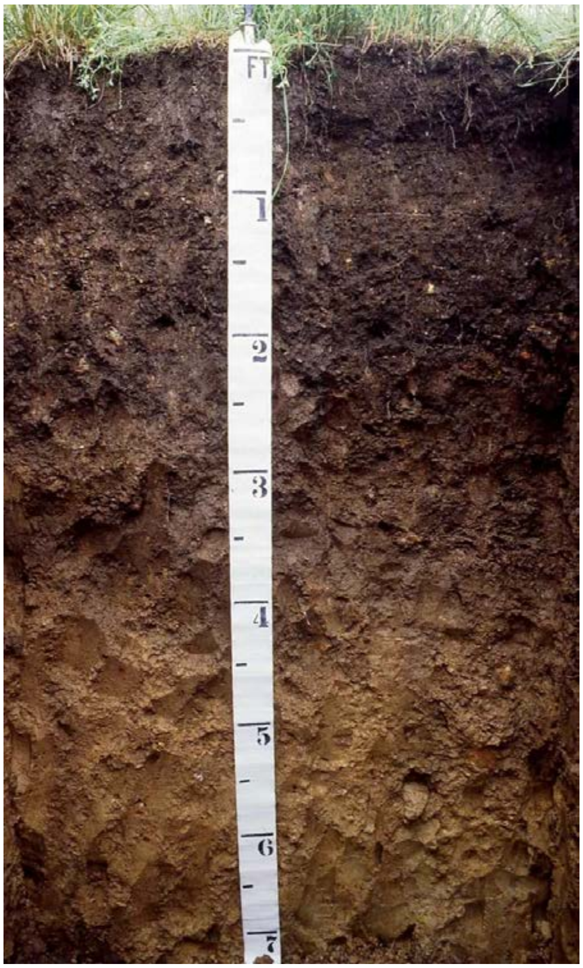


Fig. 92. Fluventic Hapludoll on a stream terrace in the Eastern Pennyroyal (USDA-NRCS).

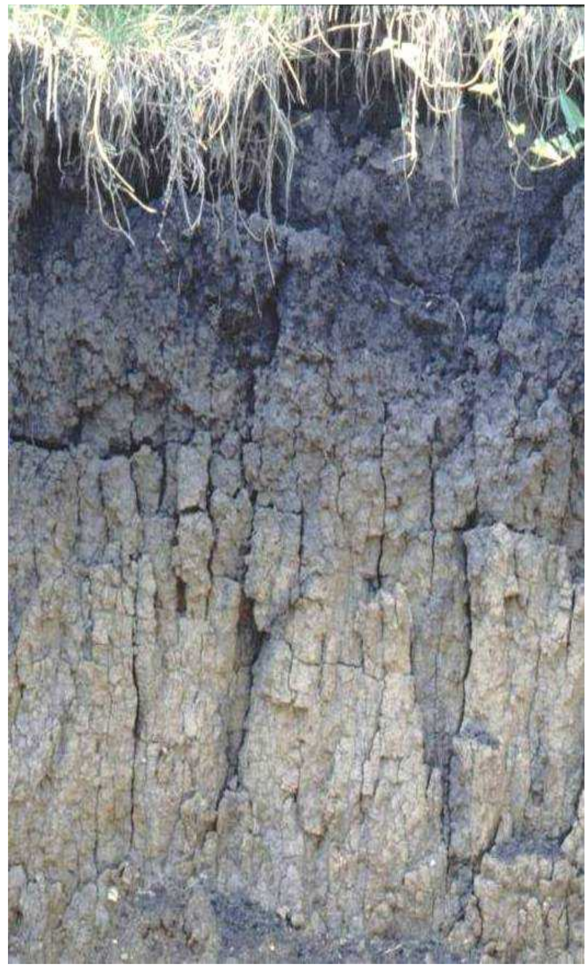


Fig. 93. Oxyaquic Argiudoll on a footslope in the Inner Bluegrass (A.D. Karathanasis).

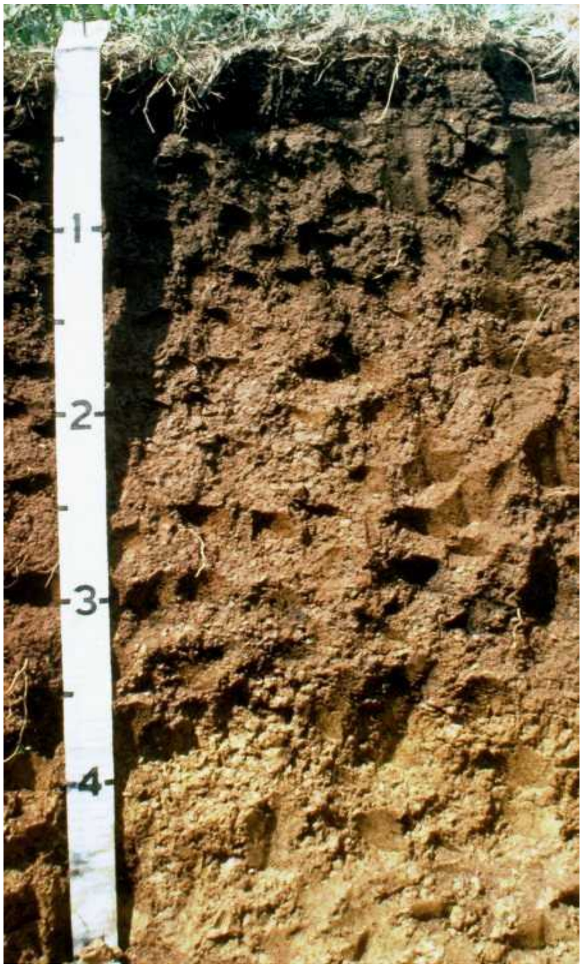


Fig. 94. Typic Argiudoll in the Inner Bluegrass (A.D. Karathanasis).

Fig. 95. Fluvaquentic Endoaquoll in the Inner Bluegrass (A. D. Karathanasis).

Entisols

Entisols cover about 3% of the mapped area in Kentucky with 28 soil series. They usually exhibit very weak to minimal development and lack characteristic subsoil horizons. They are considered very young in age due to recent deposition of parent materials on floodplains or severe erosion processes on very steep slopes. Entisols on floodplains can be found throughout Kentucky, but those in Eastern Kentucky are sandier than in other regions due to the coarser nature of the associated parent materials. Most show distinct stratification resulting from multiple alluvial depositions. On steep mountain slopes geological erosion rates are so high that soil development is severely limited. Mountain Entisols usually also contain a considerable amount of rock fragments. Alluvial Entisols exhibit varying degrees of productivity based on soil profile characteristics and land management practices, while some of the Mountain Entisols are in timber production.

Fig. 96. Typic Udorthent in a coal mined area in the Eastern Coalfields (A.D. Karathanasis).

Fig. 97. Typic Udorthent on a sandstone parent material in the Eastern Coalfields (A.D. Karathanasis).

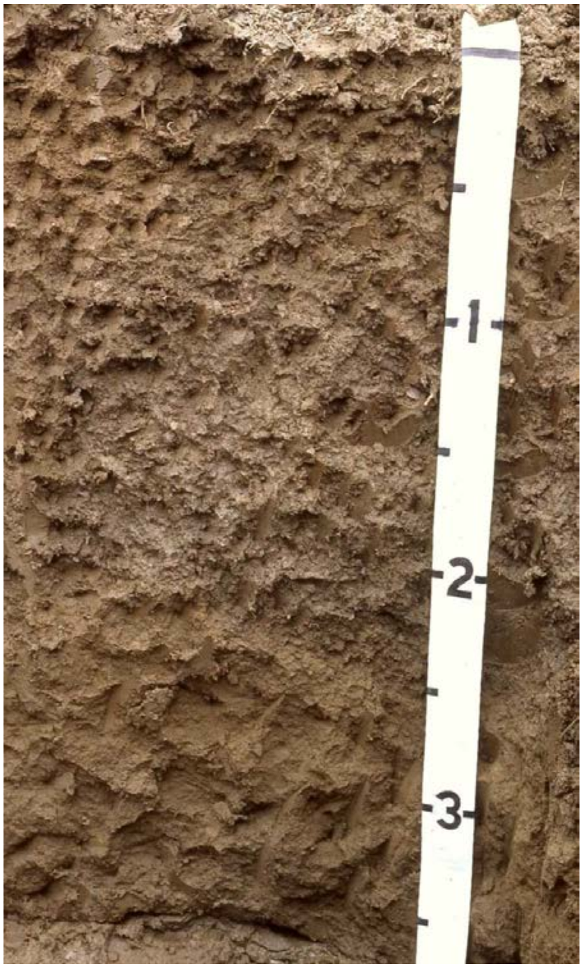


Fig. 98. Aquic Udifluvent on a floodplain in the Purchase (J. McIntosh).

Fig. 99. Aeric Fluvaquent on a floodplain in the Purchase (J. McIntosh).

Vertisols

Sharkey is the only Vertisol soil series mapped in Kentucky, occupying < 1% of the mapped area. This soil exhibits high shrink-swell potential due to an abundance of smectitic clay minerals. The seasonal churning of these materials during the dry and wet cycles prevents any subsoil development. During the dry season it shows wide cracks all the way to the surface, while during the wet season it may develop surface mounts that cause significant damage to buildings, roads, and structures. This is a poorly drained hydric soil exhibiting redox features in the upper part of the soil profile, which sometimes may be masked by relatively high organic matter content. In Kentucky these soils have developed on fine-textured alluvium deposited by the Mississippi River. Management of this soil poses unique challenges due to poor drainage and high swelling clay content.

Fig. 100. Cracks on the surface of a Sharkey soil (Chromic Epiaquert) drying out after recent flooding (A.D. Karathanasis).

Other

This part of Kentucky includes water reservoirs, urban areas, rock outcrops, dams, gullied land, mined areas, levees, gravel pits, landfills, and very shallow to bedrock soils on extreme slopes.

Hydric Soils

Only about 2.5% of Kentucky's land area contains hydric soils. Most of these soils are associated with riverine wetlands of the Mississippi and Ohio Rivers in the Purchase and the Western Coalfields, but they can occur throughout the state in floodplains, terraces or depressional landscapes. They consist of poorly or very poorly drained soils that are wet for extended periods during the year and exhibit prominent redoximorphic features (grey colors) in the upper 12 inches of the soil profile. There are 40 overall hydric soil series in Kentucky. Most of them are classified as Inceptisols (17 soil series), 7 as Alfisols, 7 as Mollisols, 5 as Ultisols, 3 as Entisols, and one as Vertisol. Most common soil series include, Melvin, Karnak, Routon, Robertsville, Dunning, Sharkey, Bonnie, Mhoon, Ginat, and Patton.

Fig.101. Fluvaquentic Epiaquept from a Mississippi floodplain in the Purchase (Ray Toor).

Fig. 102. Reduced matrix with redox concentrations in a hydric soil in the Western Coalfields (J. McIntosh).


Fig. 103. A cypress tree wetland along the Mississippi River with pneumatofores (J. McIntosh).


Fig. 104. Crayfish chimneys on the surface of a hydric soil in the Purchase (Ray Toor).

MAJOR PHYSIOGRAPHIC AND MLRA REGIONS IN KENTUCKY

According to the United States Department of Agriculture (USDA-NRCS, 2005) most of Kentucky is a part of the East and Central Farming and Forest Region (N) of the United States. The Purchase region is a part of the South Atlantic and Gulf Slope Cash Crops, Forest, and Livestock Region (P) and areas along the Mississippi River are a part of the Mississippi Delta Cotton and Feed Grains Region (O). These regions are divided into Major Land Resource Areas (MLRA) characterized by similar patterns of physiography, geology, climate, water, soils, biological resources, and land use. There are seven MLRA's represented in Kentucky, which are very closely associated to the underlying geology and physiography of the state. Kentucky soils are fairly consistent with these trends. However, individual soil series may not be confined to a single MLRA and may be present in multiple MLRA's. As indicated earlier, Kentucky is divided into eight major physiographic soil regions: the Mountains and Eastern Coalfields (MLRA 124 and 125), the Knobs (MLRA 122, 124, and 125), the Inner and Outer Bluegrass (MLRA 121), the Eastern and Western Pennyroyal (MLRA 122), the Western Coalfields (MLRA 120A), and the Purchase (MLRA 131A and 134).

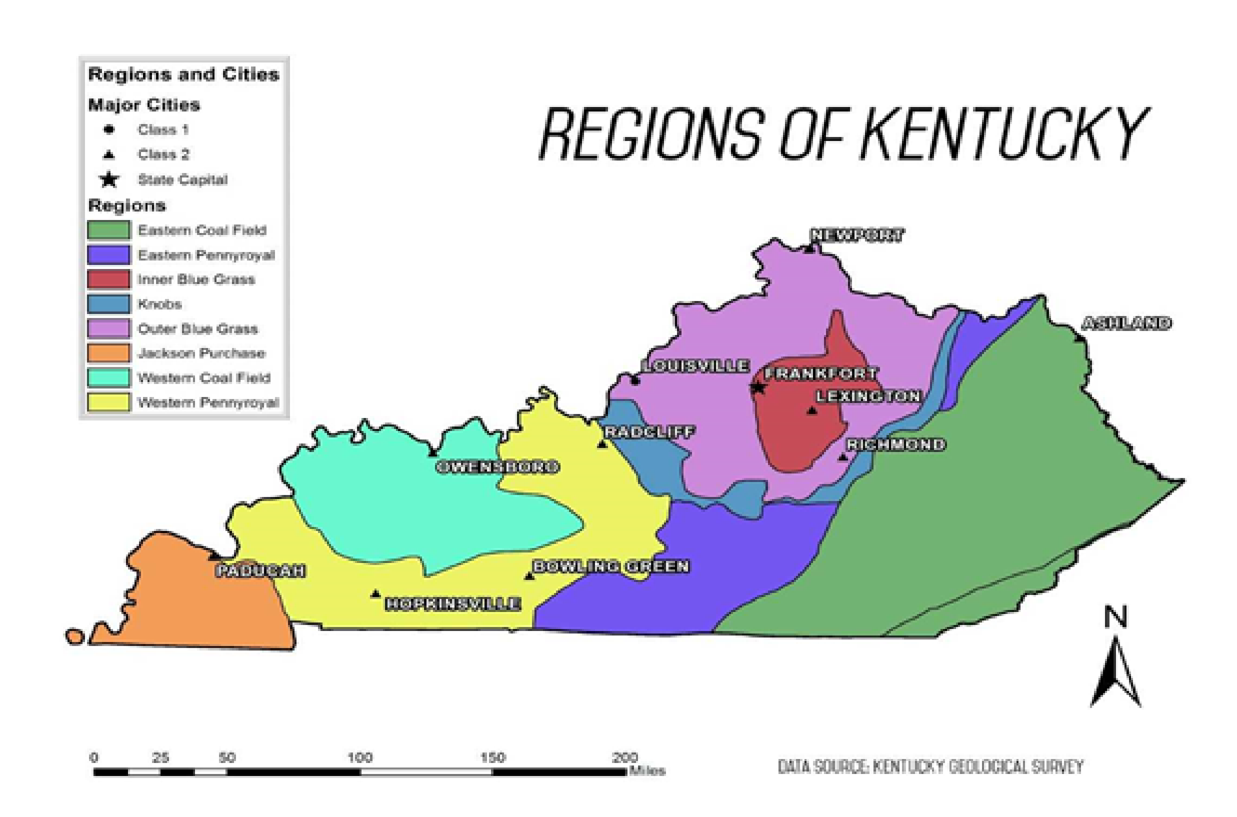


Fig. 105. Map of major physiographic regions of Kentucky (KGS).

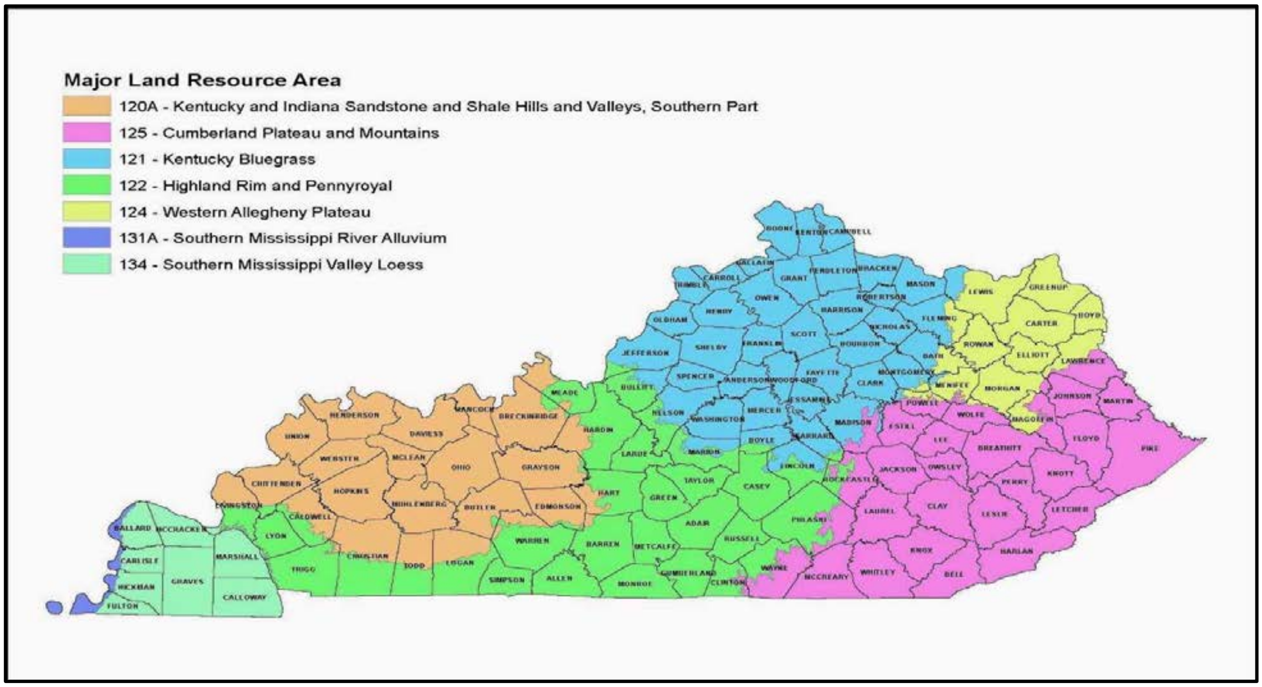


Fig. 106. Map of the seven MLRA regions represented in Kentucky (USDA-NRCS).

MOUNTAINS AND EASTERN COALFIELDS (MLRA 124 and 125)

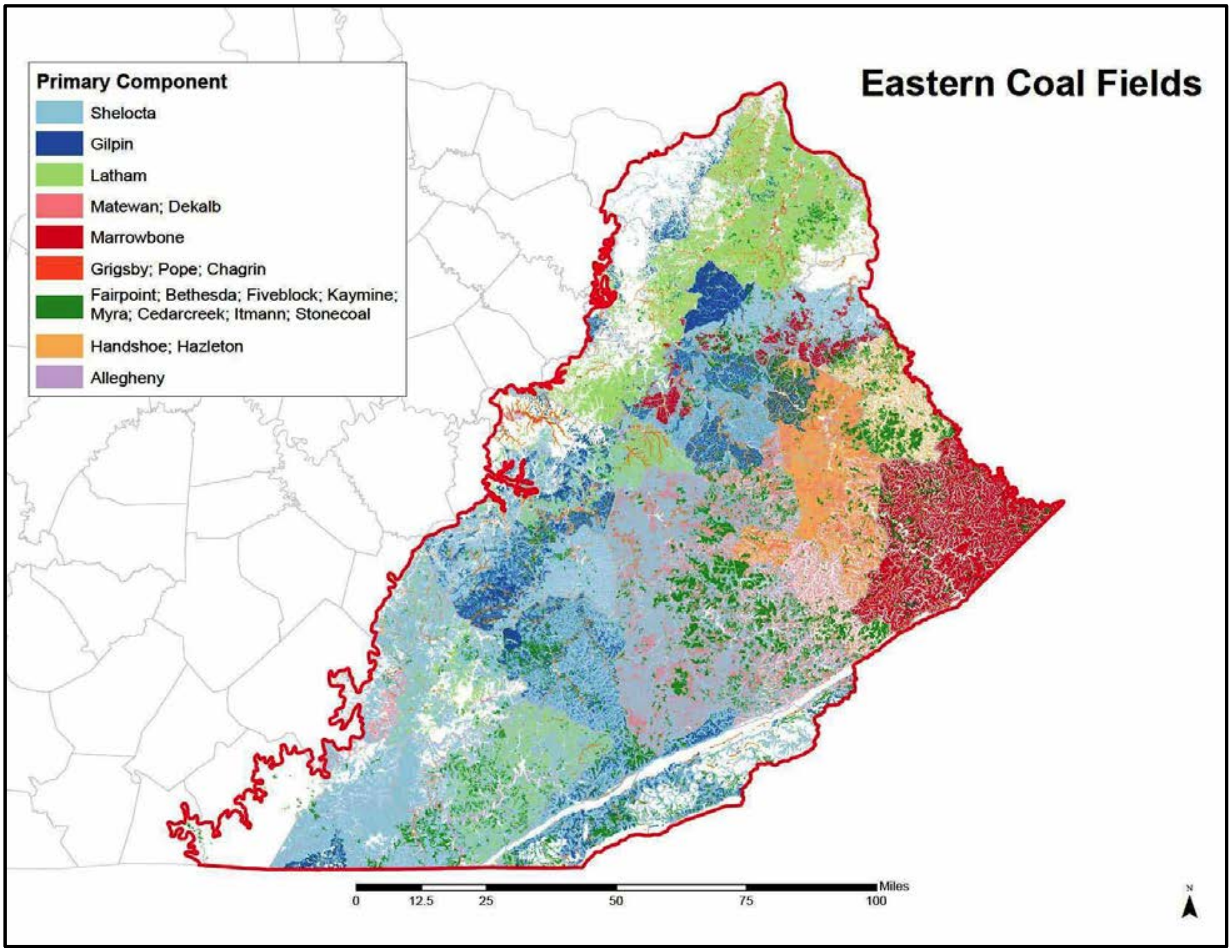


Fig. 107. Soil association map of the Mountains and Eastern Kentucky Coalfields (USDA-NRCS).

This is a rugged, deeply dissected region of more than 10,000 sq. miles (26,000 sq. km) underlain by sandstones, conglomerates, coals, siltstones, and shales of Pennsylvanian age. Mississippian age limestone, chert, shale and sandstone are exposed locally. It constitutes a part of the Cumberland Plateau and Mountains (125) in the southeast and the Western Allegheny Plateau (124) in the northeast Major Land Resource Areas (MLRA). The region is bounded on the western edge by the Pottsville Escarpment formed from resistant beds of sandstone and conglomerate in the lower part of the Pennsylvanian strata. Cumberland, Big Black and Pine Mountains (part of the Appalachian System) dominate the southeastern area. The Big Sandy, Licking, Kentucky, and Cumberland Rivers have their headwaters in these mountains. The drainage patterns are primarily dendritic.

Fig. 108. A view of Eastern Kentucky mountain scenery from Natural Bridge (A. D. Karathanasis).

Fig. 109. Family farming in a mountain hollow in eastern Kentucky (Matt Barton).

Topography ranges from mountainous to hilly. Local valleys are relatively narrow with most of the human habitation being on flood plains and low terraces. High terraces such as those associated with high-level fluvial deposits along the Kentucky River are remnants of earlier valley bottoms. Soils are formed in residuum or colluvium from acid siltstones, sandstones, and shales. They are generally low to very low in fertility.

Fig. 110. An aerial view of coal mining using the mountain top removal approach in the Eastern Coalfields (Chris Barton)

Fig. 111. Farming below a reclaimed strip mine with bench and high wall remnants in eastern Kentucky (D. McIntosh).

Fig. 112. A typical landscape featuring Dystrudepts in eastern Kentucky (A. D. Karathanasis).

Coal mining is the major industry of the region. Forested slopes are mostly used for timber production. Only about 7 percent of the entire area is suitable for farming. The plateau area has less rugged topography, and some areas are fairly well suited to general farming after lime and fertilizer are applied. The bottomlands are locally important to agriculture. Principal soils include: Shelocta, Gilpin, Latham, Matewan, Dekalb, Marrowbone, Chagrin, Fairpoint, Bethesda, Handshoe, Hazelton, and Cutshin on steeper land, Tilsit, Allegheny, and Lily on the more gentle slopes, and Grigsby, Pope and Stendal on the bottomlands. Natural scenic features such as the Breaks of the Big Sandy, Red River Gorge, Cumberland Falls, Natural Bridge, and Carter Caves are favorite tourist attractions in in the region.

Fig. 113. A scenic view of the Yatesville Lake area in Lawrence County (USDA-NRCS).

Fig. 114. Council Chambers sandstone cave, a Native American archeological site in the Red River Gorge in eastern Kentukcy (Y. Thompson).

KNOBS (MLRA 122, 124, 125)

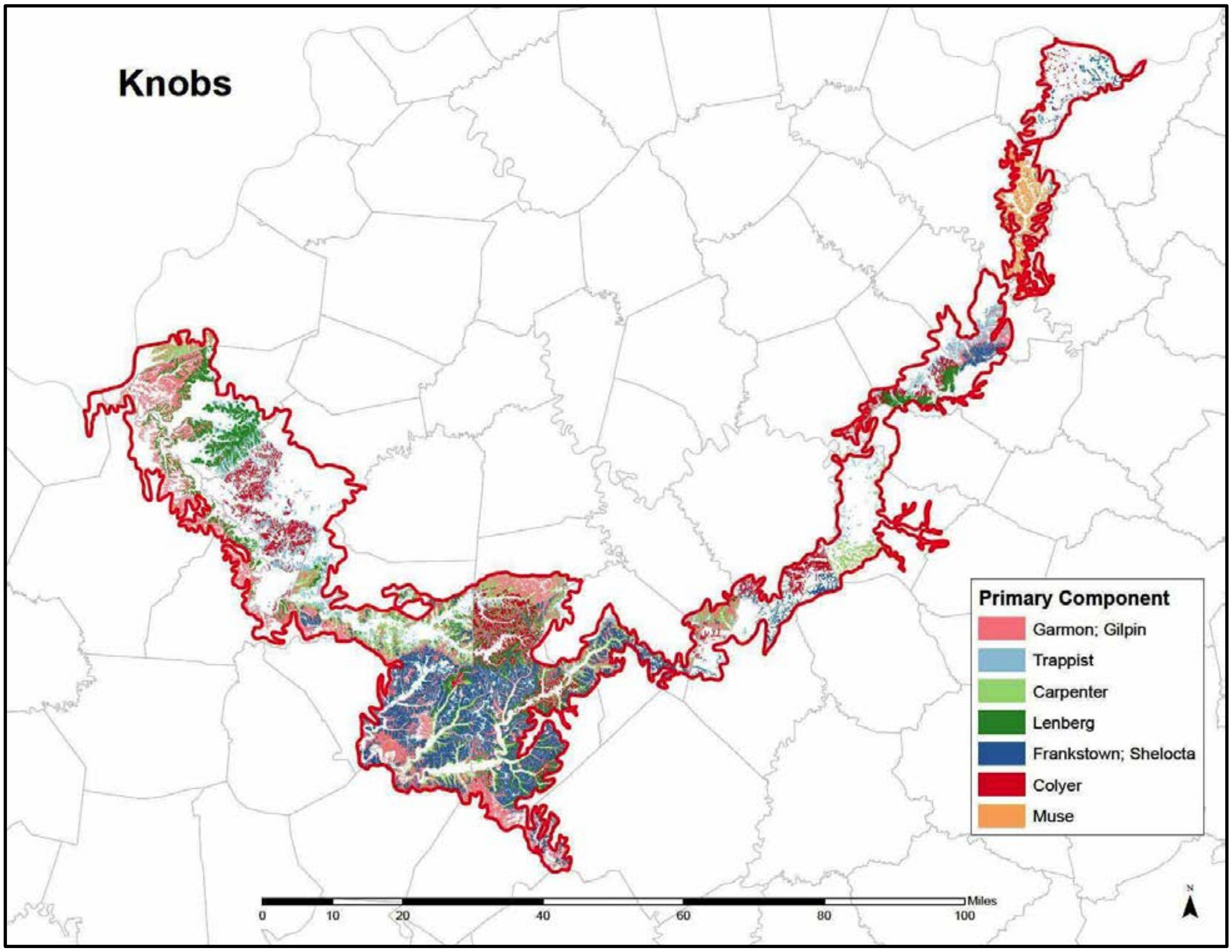


Fig. 115. Soil association map of the Knobs (USDA-NRCS).

The Knobs is a long, narrow region shaped like an irregular horseshoe 10-15 miles wide, with both ends touching the Ohio River. It is the smallest of Kentucky's landform regions covering 2,300 sq. miles. It surrounds the Bluegrass region, and it is bordered by the Mountain region in the east and the Pennyroyal in the west. The landscape is dotted with cone-shaped or rounded hills, which constitute erosional remnants or outliers of the Pottsville and Muldraughs Hill escarpments. The hills rise above surrounding plains or valley bottoms, mostly occupying narrow interfluves between broad alluvial flood plains of the rivers and creeks dissecting a nearby escarpment. The slopes steepen upward into cliffs on knobs with resistant caprocks. Knobs that have lost their protective caps have rounded crests due to accelerated erosion of the underlying shale and siltstone formations.

Fig. 116. Tobacco barn with a knob-shaped hill in the background (Y. Thompson).

Fig. 117. A Pennsylvanian-age sandstone cap holding the knob in place as an erosional remnant (KGS).

Thick colluvium on the lower slopes merges with alluvium on the valley bottoms. The area next to the Pennyroyal region is hilly and rough, but toward the Bluegrass there are wide valley floors and bottomlands between the Knobs. Soils on the forested slopes have formed from Mississippian and Devonian shales and sandstones. They are shallow with many rock outcrops and are generally poorly suited to farming. The principal soils include: Trappist, Garmon, Gilpin, Carpenter, Frankstown, Shelocta, Lenberg, Colyer and Muse. The soils of the valleys are generally acid, low in organic matter, nitrogen, and phosphorus, and are often poorly drained; however, when properly treated these soils produce fairly well.

Fig. 118. Family farming in the Knobs region of Kentucky (USDA-NRCS).

Fig. 119. Devonian Ohio shale outcrop in the Knobs of Kentucky (A. D. Karathanasis).

BLUEGRASS (MLRA 121)

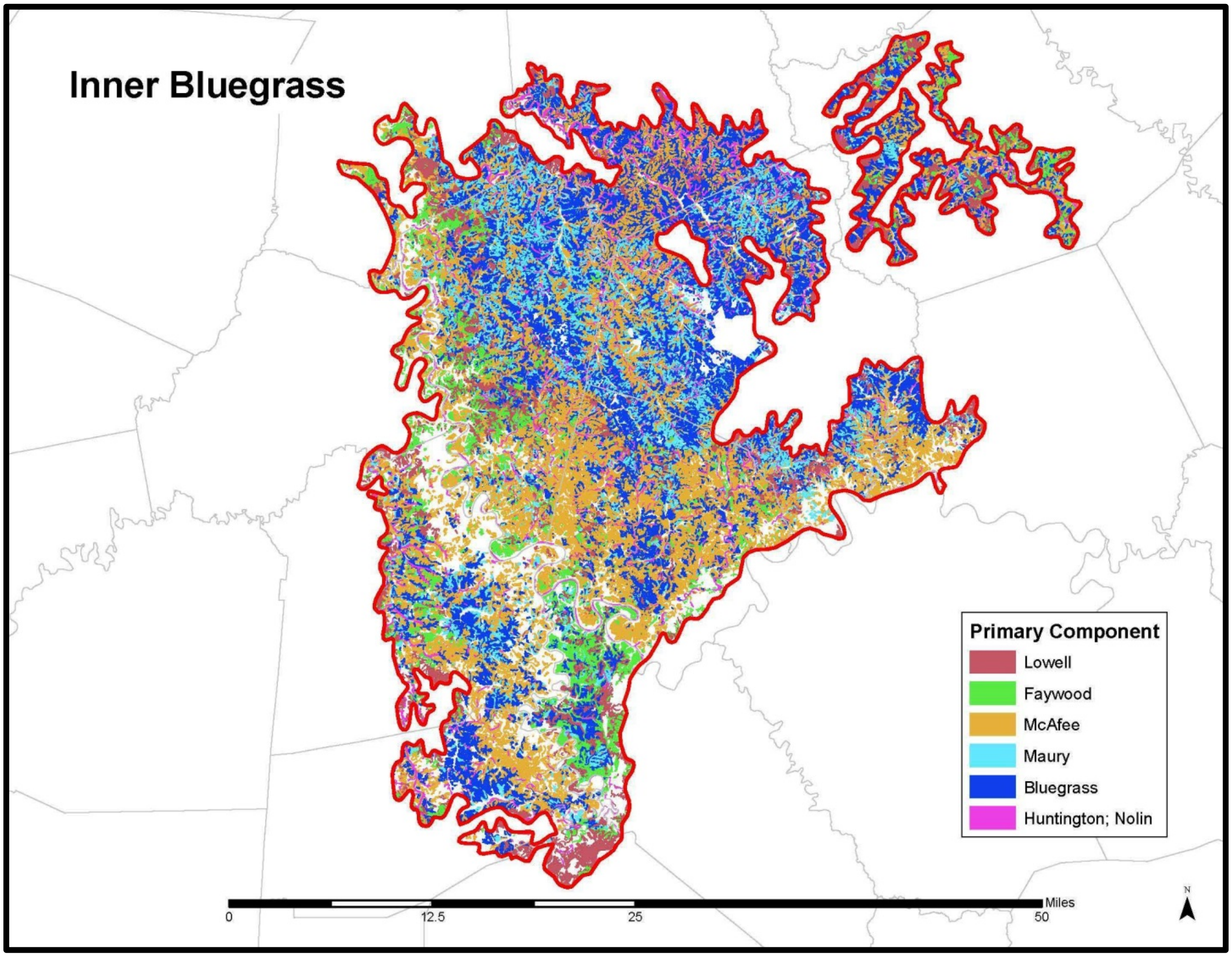


Fig. 120. Soil association map of the Inner Bluegrass (USDA-NRCS).

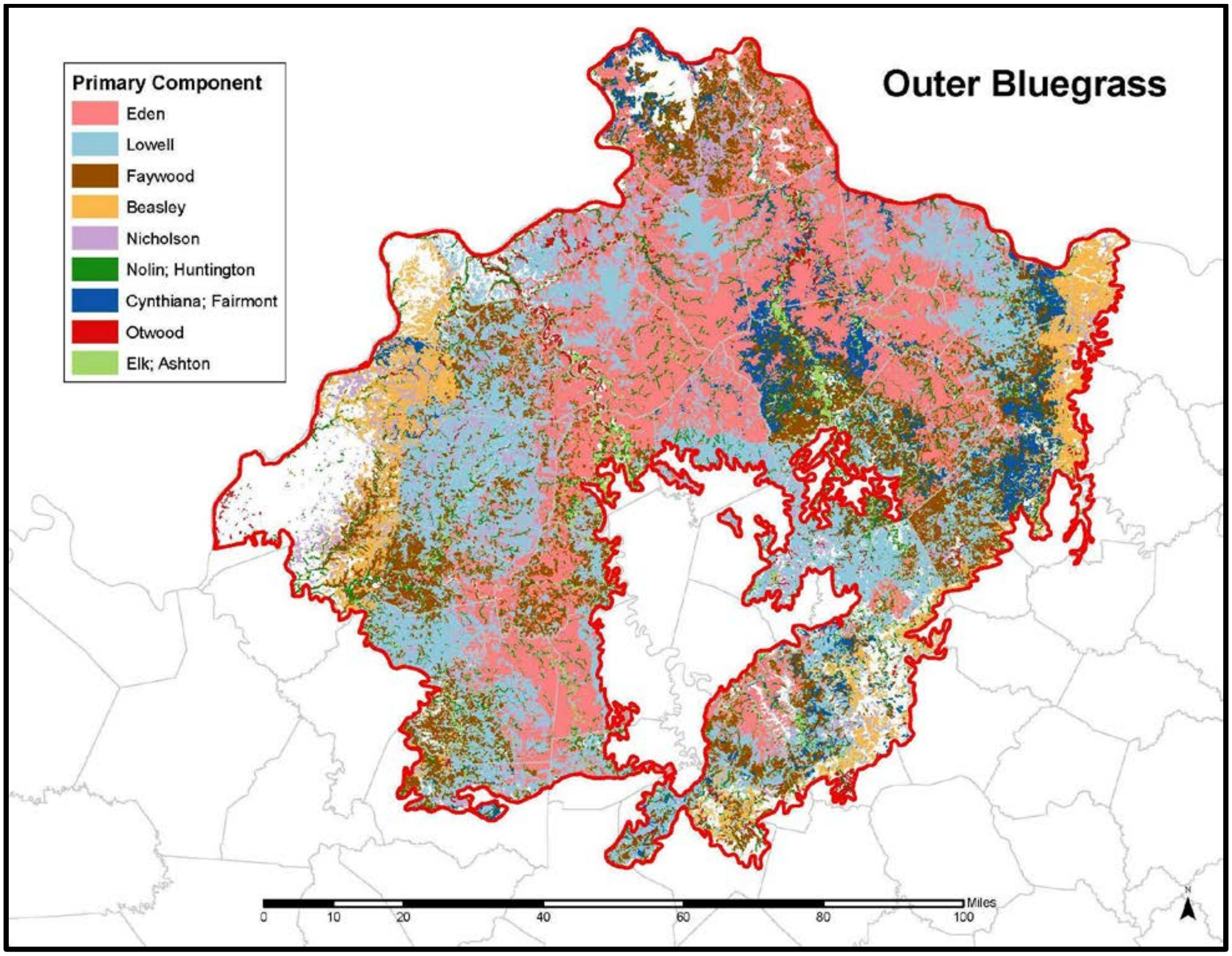


Fig. 121. Soil association map of the Outer Bluegrass (USDA-NRCS).

The Bluegrass Region (MLRA 121) is considered the geographic and historical heart of Kentucky. It is encircled by the Knobs and the Ohio River and covers about 8,000 sq. miles (31,000 sq. km). About one half of the state's population resides in this region. The terrain is gently undulating, varying in elevation from 800-1,000 feet (240-300 m) above sea level. The area is coextensive with the outcrop of Ordovician and Silurian carbonates and shales exposed on the crest and flanks of the Cincinnati arch. The region, which takes its name from the lush growth of Kentucky bluegrass (*Poa pratensis*), is subdivided into the Inner Bluegrass, mostly on Mid Ordovician phosphate-enriched limestone, and the Outer Bluegrass, mostly on limestones, dolomites, and shales of Late Ordovician and Silurian age. A transition zone between these two sub-regions is known as the Eden Hills of the Bluegrass or the Eden Shale belt.

The Outer Bluegrass occurs in three discontinuous arcs surrounding the Inner Bluegrass region of Kentucky. It differs from the Inner Bluegrass in that it has a more dissected and rolling topography. Here, deeper soils have developed in weathered Ordovician limestones and dolostones, and shallow soils have formed mainly over shales. Silurian shales, with abundant swelling clays, typically result in small, low-angle landslides and underlie zones of unstable slopes. The Licking River flows through the eastern part of the Bluegrass. The Kentucky River crosses the region and flows through meanders entrenched 200 to 300 feet below the plains and low hills. These river bottoms are narrow, sinuous, and confined by limestone cliffs and steep, wooded slopes covered with colluvium. The confined terraces and flood plains are narrow and discontinuous. River and stream valleys widen at their confluence with the Ohio River. Along the Ohio River Valley, steep ravines and bluffs descend from the Bluegrass plains to the river terraces. The plains surrounding the entrenched meanders of the major rivers include high terraces of weathered river alluvium which predate rapid downcutting to the Ohio River's current base level. The area is suited to general farming and in particular to pasture and hay crops. Good burley tobacco is produced on most of these soils. Fruit crops and livestock production are also important commodities. Principal soils include: Lowell, Shelbyville, Faywood, Beasley, Otway, Crider, and Shrouts. The area nearest Cincinnati, Ohio has had some influence from glacial activity with Ryker and Cincinnati being representative soils. The Hills of the Bluegrass lie in a circle separating the Inner and Outer Bluegrass and constitute a well-dissected plateau area characterized by narrow winding ridges and valleys. Hillsides generally slope 20 to 30 percent and surface rock is frequently present. Soils have formed from Ordovician limestones, calcareous shales and siltstones. They are generally shallow but fairly high in phosphorus and potassium although frequently droughty. Principal soils include: Lowell, Eden, Culleoka, Faywood, Beasley, Nicholson, Cynthiana, Bedford, Elk, and Fairmount, which are mostly suitable for pasture and hay production. About 10 – 15 percent of the area is suited to row crops.

Fig. 122. Outer Bluegrass landscape dominated by Lowell soils (Chad Lee).

Fig. 123. Tobacco field and barn in the Outer Bluegrass (Chad Lee).

Fig. 124. Kentucky River palisades (Adam Jones).

The Inner Bluegrass is characterized by low, gently rolling relief, abundant shallow sinkholes, thick, phosphatic residual soils of exceptional fertility, and sparse outcrops. It contains the oldest rocks exposed in Kentucky, which were raised to their present position by uplift along the Cincinnati Arch. They are dominantly thick-bedded limestones interbedded in places with clay shales of Middle Ordovician Age. Some of the limestone strata are enriched in phosphate minerals. The Inner Bluegrass is famed for its high phosphate soils, billowing grasslands, plank fences, thoroughbred horses, burley tobacco, and bourbon whisky. Central Kentucky's thriving thoroughbred industry owes its success to the high calcium and phosphate content in the soil and forage with the resulting sturdy bone development in the horses. As early as 1800, farmers noticed that horses grazing in the Bluegrass region were hardier than those from other regions. The Kentucky River meanders through thick limestone formations and offers a marked contrast to the surrounding landscape by forming picturesque palisades along a deep gorge. Soils are generally deep on gentle slopes with thin loess mantle in places and shallower on steeper topography. Major soils in the region include Maury, Bluegrass, Lowell, Loradale, McAfee, Faywood, Fairmount, and Ashton in upland areas and Huntington with Nolin on floodplains. They are mostly used for pasture, hay, and row crops, with horse farms, beef cattle, and burley tobacco being the main enterprises. Extensive areas of urban development are present.

Fig. 125. Picturesque horse farm on a Bluegrass soil in the Inner Bluegrass (A.D. Karathanasis).

Fig. 126. Corn field landscape in an early morning haze in the Inner Bluegrass (Chad Lee).

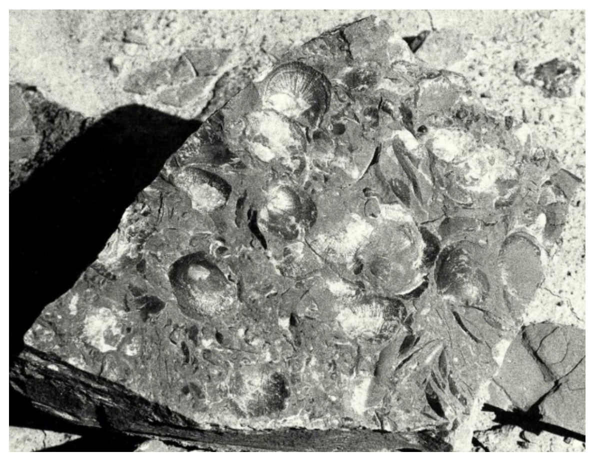


Fig. 127. Brachiopod fossils in Ordovician Limestone (USDA-NRCS).

Fig. 128. Rupp Arena, Lexington, home of the University of Kentucky basketball Wildcats (A.D. Karathanasis).

PENNYROYAL (MLRA 122)

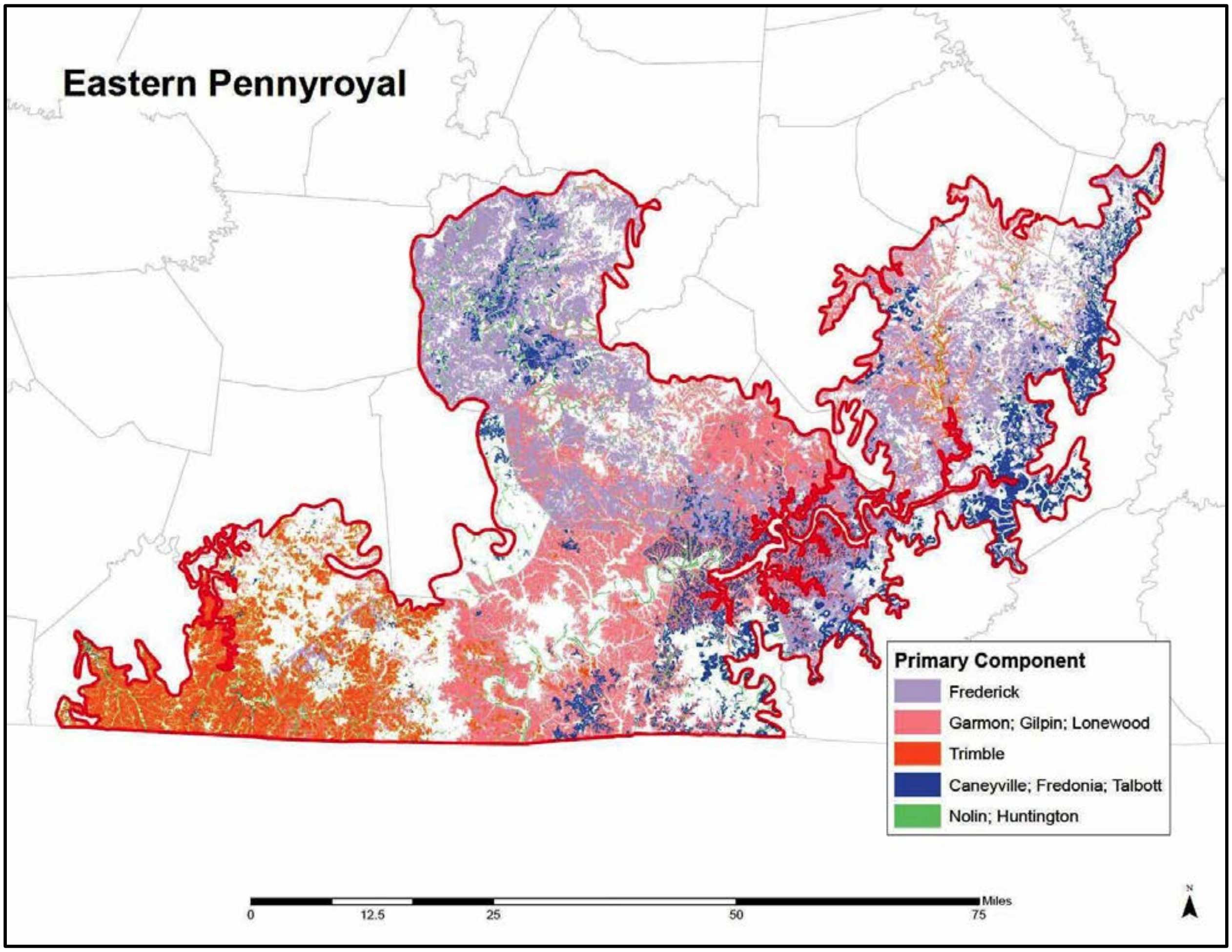


Fig. 129. Soil association map of the Eastern Pennyroyal (USDA-NRCS).

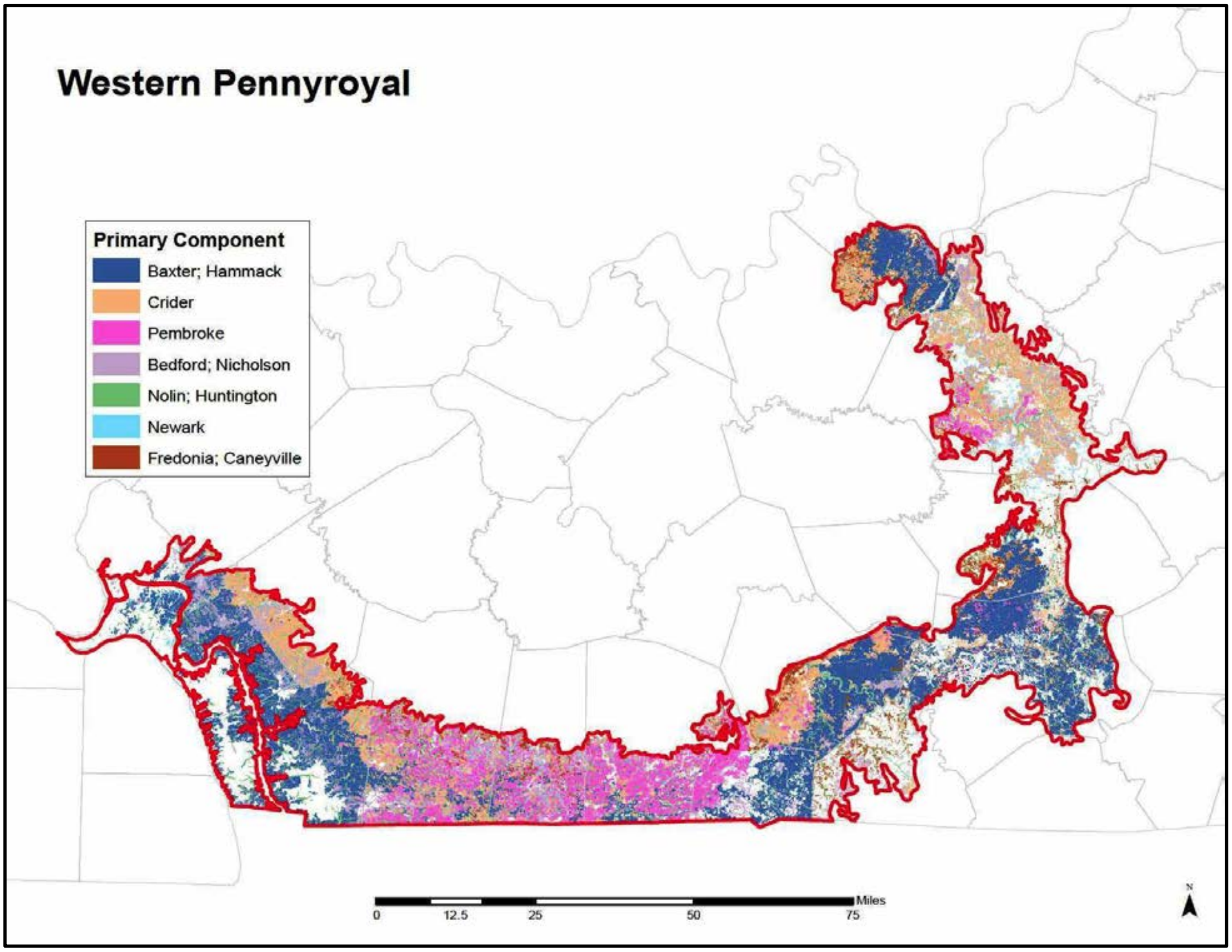


Fig. 130. Soil association map of the Western Pennyroyal (USDA-NRCS).

The Pennyroyal Region (also called Pennyrile) is the largest physiographic region (12,000 sq. miles) of the state, stretching along the southern border of Kentucky from the Appalachian Plateau west all the way to Lake Barkley. It is named for a small plant of the mint family (*Mentha pulegium)*. It is part of the Highland Rim and Pennyroyal MLRA (122). The southern area of the Pennyroyal Region is karst terrain that consists of flat lands with some rolling hills underlain by Mississippian Limestones. In the center of the region lies a treeless area called The Barrens, which developed in response to repeated, historic burning off of forest cover by the Native Americans to produce grasslands for deer and buffalo. The northern section consists of rocky ridges underlain by sandstone and siltstone formations of the Dripping Springs Escarpment. The southern karst plain is characterized by thousands of sink holes, sinking streams, streamless valleys, springs, and caverns. Karst features such as these develop when the soluble bedrock, dominated by thick layers of Mississippian-age limestones, dissolve and are eroded by waters moving through the ground. Groundwater dissolution of the limestone can form miles of passages beneath the surface, from tiny paths only inches wide, to large caverns and rooms more than 100 feet wide. The Mammoth Cave-Flint Ridge Cave system of the Western Pennyroyal is the longest cave in the world with more than 400 miles of mapped cave passages.

The Eastern Pennyroyal region extends from the Knobs south of the Bluegrass southwest to Tennessee. The eastern portion of the area is mostly a limestone capped, karst plateau. Elsewhere it is largely shale with associated limestones. Topography is undulating to hilly with a rugged area along the Cumberland River. Soils have formed mainly in limestone residuum, cherty limestone, and calcareous shales with or without a loess mantle. They are medium to low in fertility with about 30 percent of the area being suitable for rotational cropping and another 30 percent suitable for pasture. Principal soils include: Frederick, Garmon, Lonewood, Gilpin, Baxter, Pricetown, Trimble, Caneyville, and Frankstown with some areas of Pembroke and Cumberland.

Fig. 131. Eastern Pennyroyal landscape in Casey County (A. D. Karathanasis).

Fig. 132. A hayfield on a Frederick soil landscape in the Eastern Pennyroyal (USDA-NRCS).

Fig. 133. Soybean field on a Trimble soil landscape in the Eastern Pennyroyal (Chad Lee)

The Western Pennyroyal region lies in a horseshoe shape to the south and west of the Eastern Pennyroyal. It is separated from the Western Coalfields region to the north by the Dripping Springs escarpment. Except for the mainly forested escarpment, the area is undulating to rolling but more gently than the eastern Pennyroyal. Most of the area is drained by the Green River and its tributaries. The river valley and karst drainage network are influenced by the regional dip of the limestone strata away from the Cincinnati Arch and into the Western Coal Fields Region. The rugged topography of the northern section results from headward erosion by the Green river and its tributaries. The southern part of the region has more pronounced karst features with common sinkholes, sinking streams and extensive cave networks. Soils have developed from Mississippian Limestone residuum of varying degrees of purity. A loess mantle of variable thickness is common. Soils are generally deep, well drained and well suited to a variety of agricultural uses. Mainstay crops include corn, soybeans and winter wheat. Other crops include burley tobacco and fire-cured tobacco. Beef and dairy cattle are also important to the local economy. Crider, the State Soil is abundant in this area. Other principal upland soils include: Pembroke, Baxter, Bedford, Nicholson, Vertrees, Fredonia, and Hammack. Nolin, Huntington, and Newark are common soils in sinkholes and alluvial plains.

Fig. 134. Aerial view of karst topography near Bowling Green, Kentucky, in the Western Pennyroyal (KGS).

Fig. 135. Karst spring in the Western Pennyroyal (A. D. Karathanasis).

Fig. 136. A cherty limestone soil in the Western Pennyroyal (A. D. Karathanasis).

Fig. 137. Visual effects of erosion on a Crider landscape planted to corn in the Western Pennyroyal (J. McIntosh)

Fig. 138. Cattle near a sinkhole pond plugged with clay in the Western Pennyroyal (KGS).

The western end of the Western Pennyroyal region is known as the Land Between the Lakes (LBL). It is a hilly region of about 266 sq. miles (690 sq. km) extending from about 5 miles east of the Cumberland River to about 5 miles west of the Tennessee River. The LBL is an inland peninsula formed when the Cumberland and Tennessee Rivers were impounded (1966 and 1944, respectively) creating Lake Barkley and Kentucky Lake. In 1963, the region was designated as a National Recreation Area and now welcomes over 2 million visitors a year. Land Between the Lakes and the adjacent state parks offer recreational facilities to support camping, hiking, horseback riding, boating and fishing, off road vehicles, mountain biking, and wildlife viewing. Soils have formed mainly on gravelly coastal plain sediments and cherty beds with thin remnants of loess in places. They are generally low in fertility, droughty, and inferior for agriculture. However, they are well suited to forestry and wildlife and extensive areas are used for recreational purposes. Principal soils include: Saffel, Brandon, and Lax.

Fig. 139. Aerial view of Land Between the Lakes in western Kentucky (Kentucky Tourism).

Fig. 140. At Land Between the Lakes, bison were re-introduced to a native grassland habitat that was once common in this region of Kentucky (Genuine Kentucky).

WESTERN COALFIELDS (MLRA 120A)

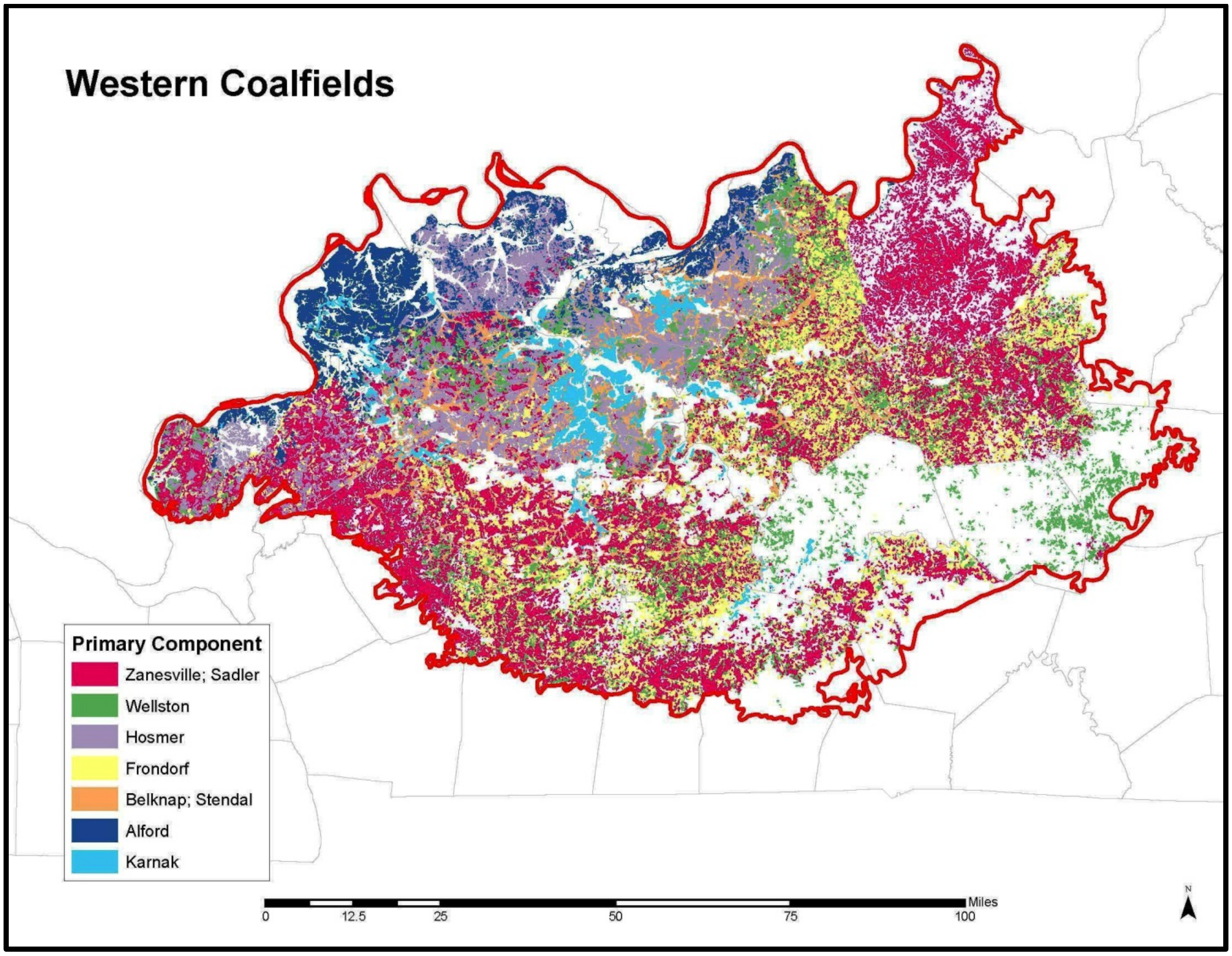


Fig. 141. Soil association map of the Western Coalfields (USDA-NRCS).

Surrounded by the Pennyroyal (south, east, and west) and the Ohio River (north), the Western Coalfields cover an area of about 4,700 sq. miles (12,000 sq. km). It constitutes the southern part of the Kentucky and Indiana Sandstone and Shale Hills and Valleys MLRA (120A). It is a hilly upland of low to moderately high relief dissected by rivers and streams that form wide and poorly drained valleys. The hills and valleys define a system of cuestas and faults in a structural basin underlain by Pennsylvanian sandstones, siltstones, shales and coal beds. Relief increases toward the margin of the basin, and much of this area is forested. Rocks underlying the uplands, particularly shales and siltstones, are generally deeply leached and readily weathered.

Fig. 142. Rolling hill landscape of the Western Coalfields (USDA-NRCS).

The weathered overburden is easily excavated to expose thick coal beds on both hilltops and valley bottoms. Extensive surface mining of this coal has reshaped the topography of vast areas. The Green and Tradewater Rivers and their tributaries have considerably eroded the adjacent landscapes and deposited thick alluvium on floodplains. The northern boundary of this region is the alluvial valley of the Ohio River. Many of the extant wetlands in Kentucky are found on poorly drained soils in this region.

Fig. 143. Coal mine reclamation in the Western Paradise Coalfields (A. D. Karathanasis).

Fig. 144. Aerial view of the coal-fired Power Plant operated by TVA in Muhlenberg County, Kentucky (KGS).

The northern section of this region occupies valleys and low hills bordering the Ohio River. Upland soils have generally developed in loess and loess over sandstones, siltstones and shales.

They are of medium fertility, suitable for farming, but some of them contain restrictive fragipan layers. Bottomland soils are extensive and generally need drainage. Overflow soils of the Ohio River are generally fertile with dark surfaces and textures ranging from silt loam to silty clay. They are neutral in reaction and well supplied with phosphate. Principal soils of the uplands include: Sadler, Zanesville, Wellston, Frondorf, Lenberg, Hosmer, and Alford. Belknap, Stendal and Karnak are common alluvial soils on the bottomlands. Chief crops of the area include corn, soybeans, winter wheat, grain sorghum and hay. Swine and poultry enterprises are also important.

Fig. 145. Cross section of a fragipan in a Zanesville soil in the Western Coalfields (J. McIntosh).

Fig. 146. Hayfield on an Alford-Hosmer landscape (J. Kelley).

The southern section of the Western Coalfields Region extends in an arc from near Smithland to the Ohio River west of Brandenburg. Soils have generally developed from sandstone, shale, and some limestone (southern part of the area) with or without a loess mantle. They are medium to low in fertility, particularly those with fragipan layers. Much of the topography is hilly and more dissected than the northern region, but numerous areas of undulating to level uplands and considerable bottomlands are also present. The more level areas of uplands and parts of the bottomlands are poorly drained. Principal soils include: Frondorf and Lenberg on the steeper slopes, Sadler and Zanesville, on the moderate to more level uplands and Sharon, Bonnie, and Belknap on alluvial bottomlands. Grain crops, poultry, and beef cattle are the main commodities in this area.

Fig. 147. Corn field harvest near Elizabethtown, Kentucky (Chad Lee).

Fig. 148. Wheat harvest on a Zanesville landscape behind a hay barn in the Western Coalfields (J. Archambeault).

PURCHASE (MLRA 131A and 134)

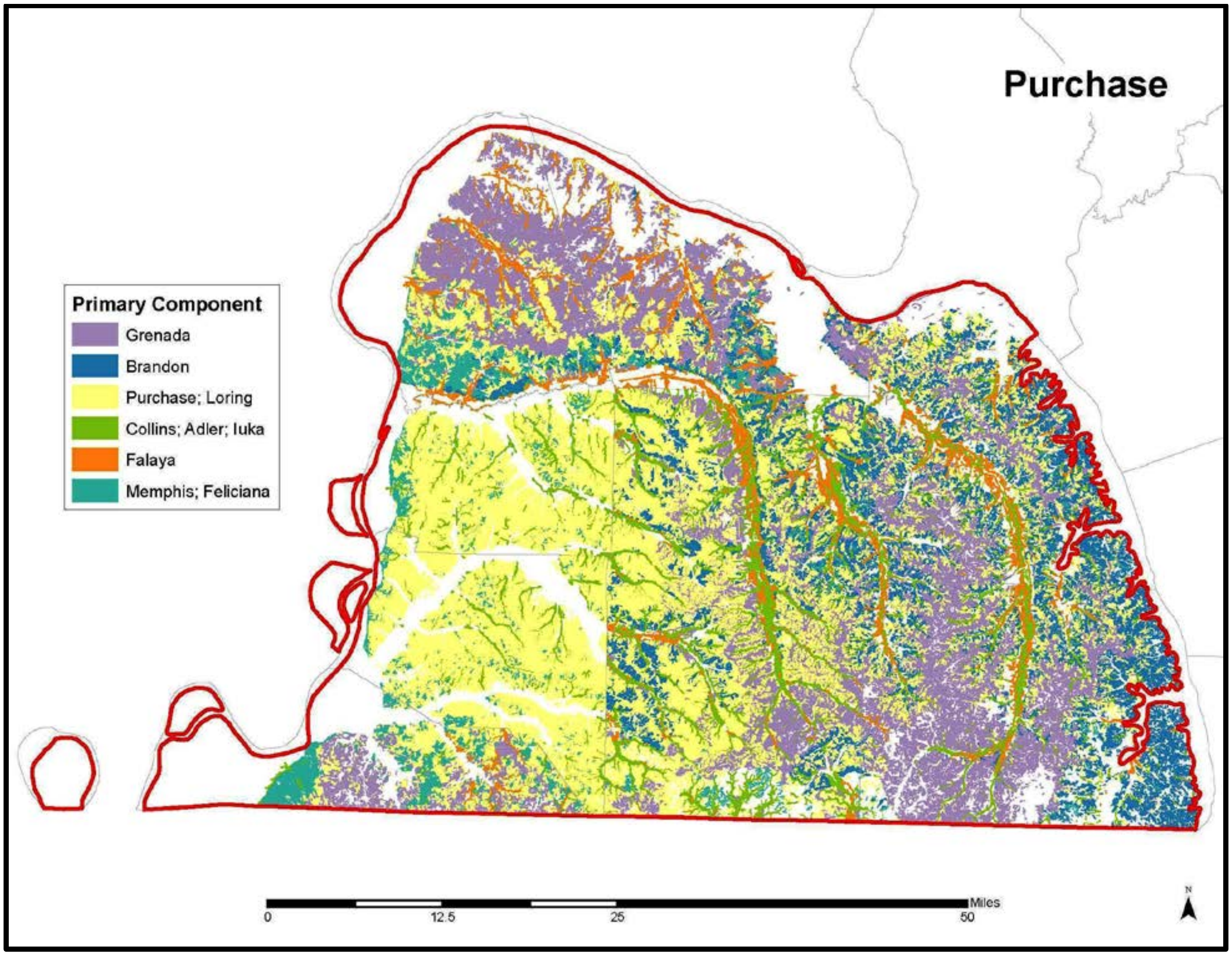


Fig. 149. Soil association map of the Purchase (USDA-NRCS).

The Purchase Region (also called Jackson Purchase), the most western region in Kentucky, encompasses about 2,600 sq. miles (6,650 sq. km). Its name refers to its purchase in 1818 by Andrew Jackson by a virtue of a treaty with the Chickasaw people. It is a part of the Southern Mississippi Valley Loess and the Southern Mississippi River Alluvium MLRA (134 and 131A). The region is bounded by the Kentucky Lake on the east, the Ohio River on the north, and the Mississippi River on the west. Geologically, the Purchase is the northernmost extent of the Gulf Coastal Plain. The uplands are underlain by unconsolidated Mesozoic and Cenozoic sand, gravel, silt, and clay. Valley bottoms of the major rivers and their tributaries are underlain by Quaternary alluvium. A mantle of windblown loess, which decreases in thickness eastward covers the area. Extensive gully erosion has reworked much of the loess blanket and upland gravel into colluvium and alluvium which are redeposited in and along the margins of smaller streams.


Fig. 150. A Loring-Purchase association landscape in the Purchase (J. McIntosh).

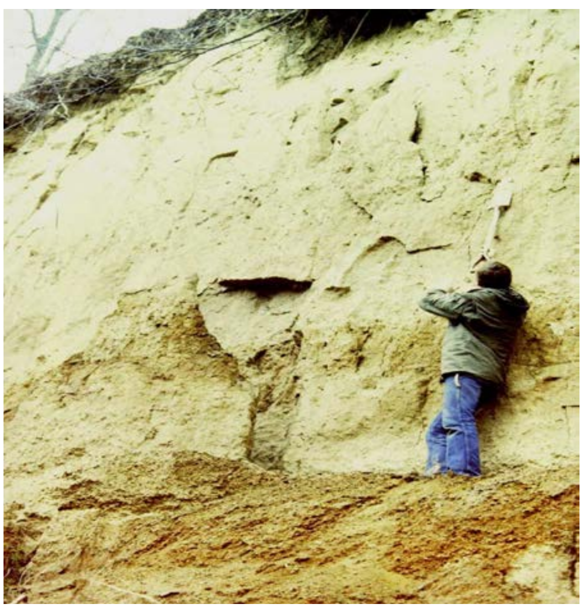


Fig. 151. Loess bluff along the banks of the Mississippi River (A. D. Karathanasis).


Fig. 152. Clark's River floodplain in the Purchase (J. McIntosh).

The eastern area of the Purchase region is gently undulating to rolling with about 25 percent being bottomlands and the remainder well to poorly drained uplands. Soils are derived mainly from deep loess which lies over sand, gravel, and in a few places, clay. Most soils are medium in fertility and are suitable for farming, but erosion is a problem even on gentle slopes.

Principal upland soils include: Memphis, Loring, Grenada, Calloway, Brandon, Purchase, Feliciana and Lax. Fragipans occur in many of the upland soils and present considerable limitations to crop production. Collins and Falaya are common floodplain soils. Chief crops are corn, soybeans, tobacco, grain sorghum, and alfalfa. Poultry, swine, and beef cattle are also important commodities. The Mississippi River Flood Plain area is level and generally poorly drained. On the Mississippi and Ohio River bottomlands, oxbow lakes and natural swamps have developed due to the meandering of the river channels across their flood plains. Extensive floods are common, especially in the spring. The Mississippi River crosses the Madrid Fault zone here, and intensive earthquakes in 1811 and 1812 caused the Mississippi River to flow backwards and created Reelfoot Lake along the Tennessee border. Soils have developed from Mississippi River alluvial silty and clay sediments and are high in fertility and productive when drained. Principal soils include: Tunica, Sharkey, Commerce, and Robinsville.


Fig. 153. Wheat field in the Purchase (Chad Lee).


Fig. 154. A center pivot irrigation system on a wheat field in the Purchase (J. McIntosh).


Fig. 155. Poor corn stand due to excessive internal wetness on a hydric soil in the Purchase (J. McIntosh).

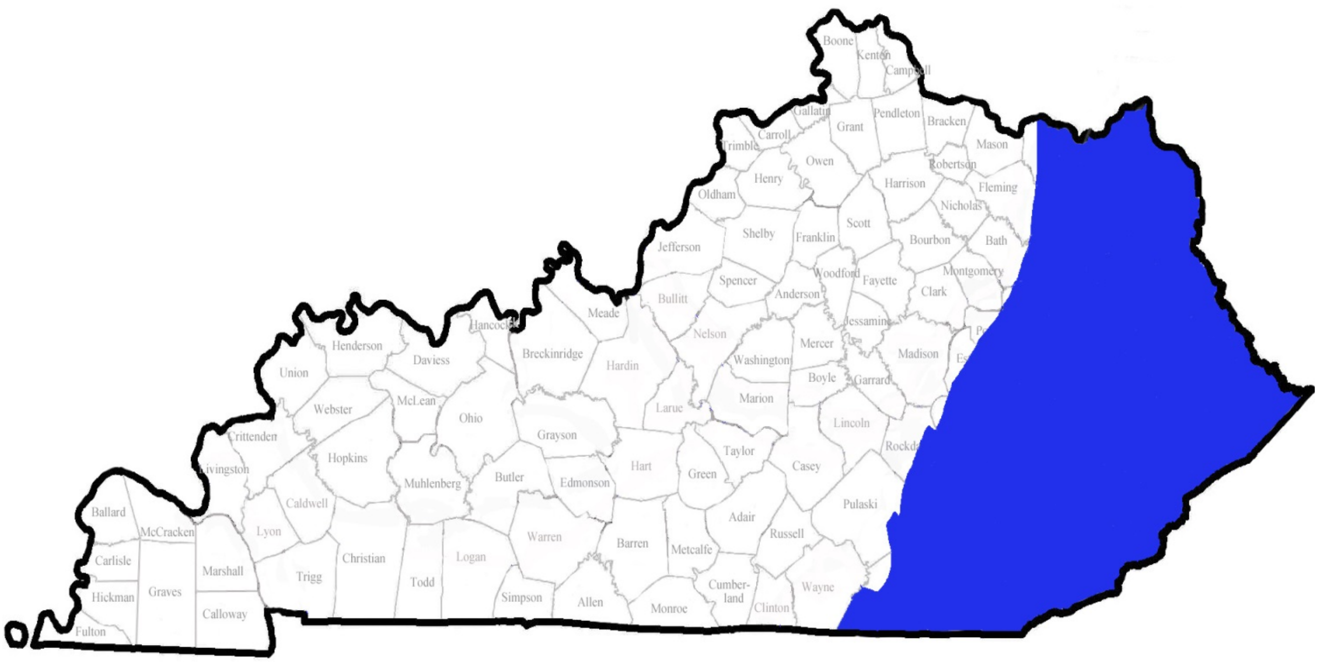

Fig. 156. A bald cypress wetland during the dry season of the year in Hickman County, Kentucky (J. McIntosh).

SELECTED SOIL SERIES

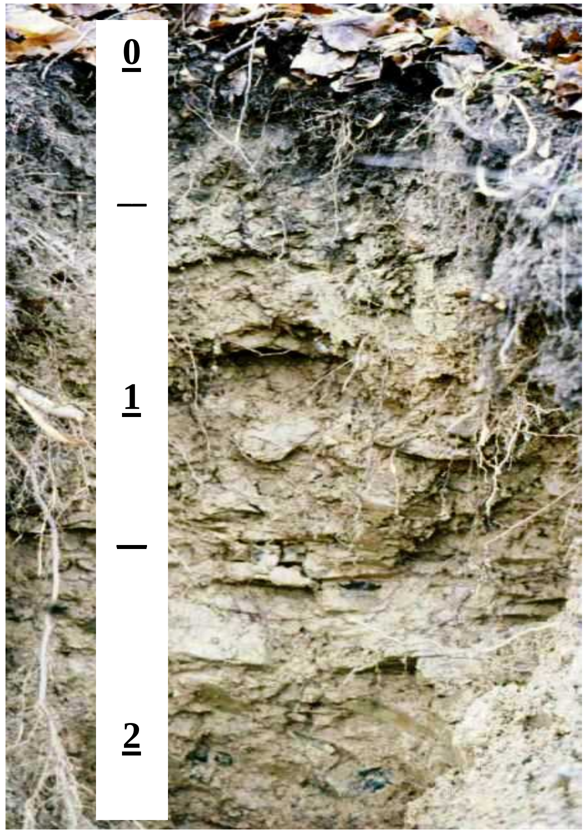
BY PHYSIOGRAPHIC REGION

Mountains and Eastern Coal Fields Region

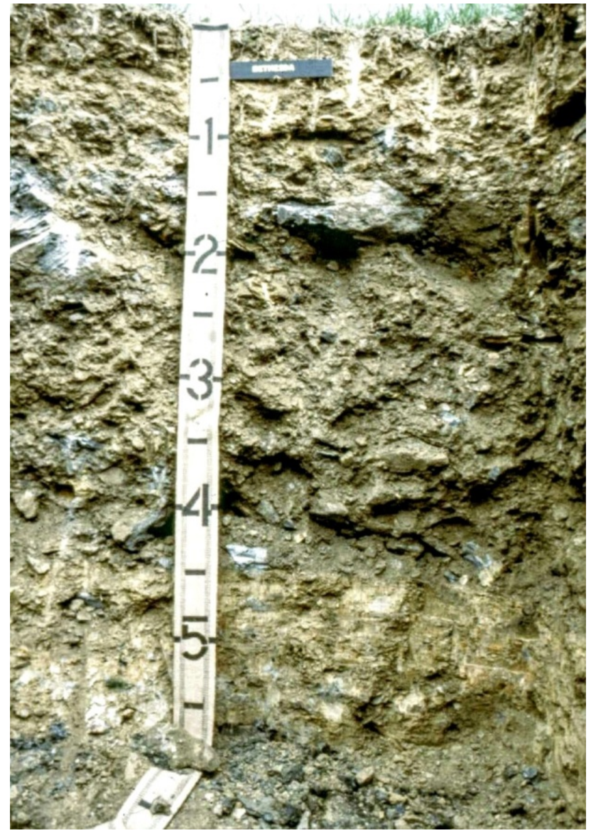
MLRA 124 and 125



Tape units: feet. Photo: USDA-NRCS



Tape units: feet. Photo: A. D. Karathanasis



Tape units: feet. Photo: A.D. Karathanasis

Allegheny

The Allegheny series consists of very deep, well drained soils that formed in alluvium. They are found on stream terraces and alluvial fans in river valleys. Slopes range from 0 to 25 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, semiactive, mesic Typic Hapludults

Berks

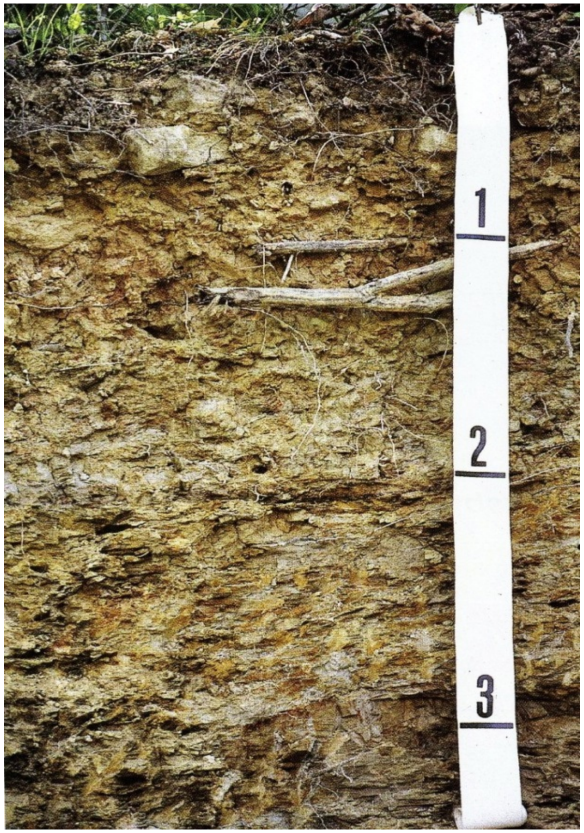
The Berks series consists of moderately deep, well drained soils that formed in residuum weathered from shale interbedded with fine grained sandstone and siltstone. These soils are on summits, shoulders, and backslopes of dissected uplands. Slopes range from 0 to 80 percent.

TAXONOMIC CLASS: Loamy-skeletal, mixed, active, mesic Typic Dystrudepts

Bethesda

The Bethesda series consists of very deep, well drained soils that formed in coal extraction mine spoil derived from regoliths of shale, sandstone and siltstone. They are found on summits, shoulders, backslopes, footslopes and toeslopes. Slopes range from 0 to 90 percent.

TAXONOMIC CLASS: Loamy-skeletal, mixed, active, acid, mesic Typic Udorthents



Tape units: feet. Photo: USDA- NRCS

Blairton

The Blairton series consists of moderately deep, somewhat poorly and moderately well drained soils that formed in residuum weathered from noncalcareous gray shale and some sandstone. These soils are on upland flats, depressions, and in drainage heads. Slopes range from 0 to 35 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, active, mesic Aquic Hapludults

Tape units: inches. Photo: USDA- NRCS

Bouldin

The Bouldin series consists of deep, somewhat excessively drained soils that formed in stony colluvium weathered from interbedded sandstone, siltstone, and shale. They are on steep and very steep hillslopes and mountain flanks. Slopes range from 10 to 75 percent.

TAXONOMIC CLASS: Loamy-skeletal, siliceous, semiactive, mesic Typic Paleudults

Tape units: feet. Photo: USDA -NRCS

Chagrin

The Chagrin series consists of deep, well drained, moderately permeable soils. These soils are on flood plains receiving alluvium mainly from upland areas of sandstone, siltstone, shale, limestone, and low-lime glacial drift. Slopes range from 0 to 3 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, active, mesic Dystric Fluventic Eutrudepts

Tape units: inches. Photo: D. McIntosh

Cloverlick

The Cloverlick series consists of deep and very deep, well drained soils. Permeability is moderate. These soils formed in stony, loamy colluvium or residuum weathered from sandstone, siltstone, and shale. They are on hillsides and mountainsides, foot slopes and a few alluvial fans. Slopes range from 5 to 90 percent.

TAXONOMIC CLASS: Loamy-skeletal, mixed, active, mesic Humic Dystrudepts

Tape units: feet. Photo: D. McIntosh

Cutshin

The Cutshin series consists of deep and very deep, well drained soils that formed in colluvium derived from sandstone, shale, and siltstone. These soils are on footslopes and toeslopes of hillslopes and mountain slopes. Slopes range from 25 to 80 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, active, mesic Typic Humudepts

Tape units: feet. Photo: USDA- NRCS

Fairpoint

The Fairpoint series consists of very deep, well drained soils that formed in coal mine spoil derived from regolith of weathered fine-earth and fragments of shale, sandstone and siltstone. These soils are on summits, shoulders, backslopes, footslopes and toeslopes. Slopes range from 0 to 90 percent.

TAXONOMIC CLASS: Loamy-skeletal, mixed, active, nonacid, mesic Typic Udorthent

Tape units: feet. Photo: D. McIntosh

Fedscreek

The Fedscreek series consists of deep and very deep, well drained soils that formed in colluvium derived from sandstone and siltstone. These soils are on back slopes, footslopes and toeslopes of hillsides and mountain slopes. Slopes range from 8 to 90 percent.

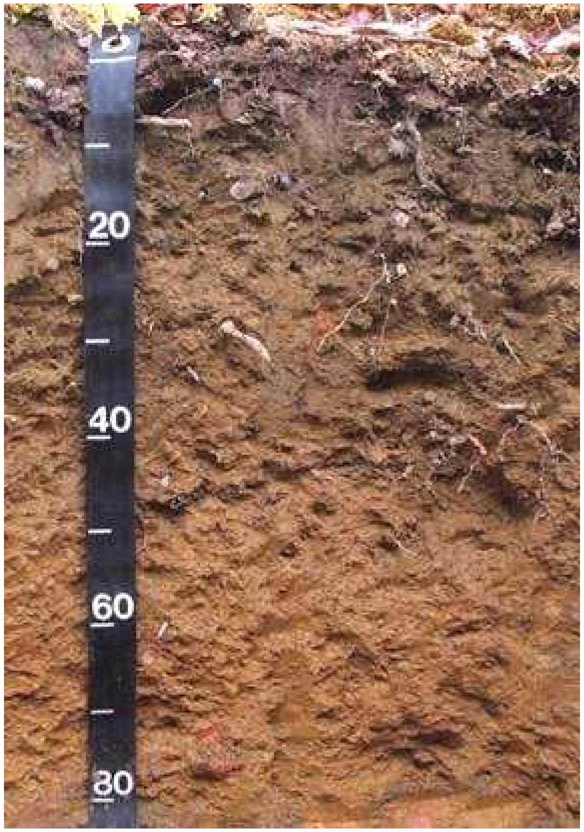
TAXONOMIC CLASS: Coarse-loamy, mixed, semiactive, mesic Typic Dystrudepts

Tape units: feet. Photo: D. McIntosh

Fiveblock

The Fiveblock series consists of very deep, somewhat excessively drained soils that formed in nonacid regolith from coal surface mine operations. The regolith is a mixture of weathered fine earth and bedrock fragments. These soils are on benches, hillslopes, or outslopes. Slopes range from 0 to 80 percent.

TAXONOMIC CLASS: Loamy-skeletal, mixed, semiactive, nonacid, mesic Typic Udorthents

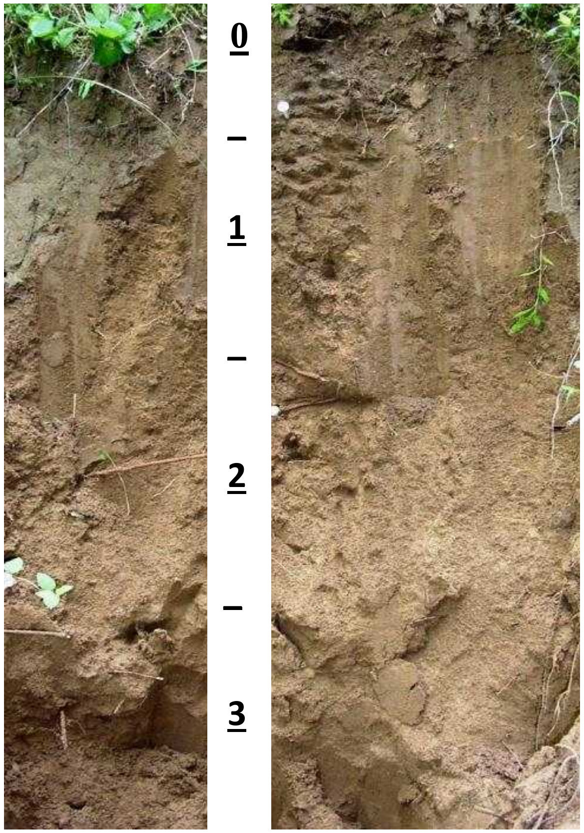


Tape units: metric. Photo: S. Blanford

Gilpin

The Gilpin series consists of moderately deep, well drained soils that formed in residuum of interbedded gray and brown acid siltstone, shale, and sandstone. These soils are on summits, shoulders, or backslopes of uplands. They are moderately permeable. Slopes range from 0 to 70 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, active, mesic Typic Hapludults

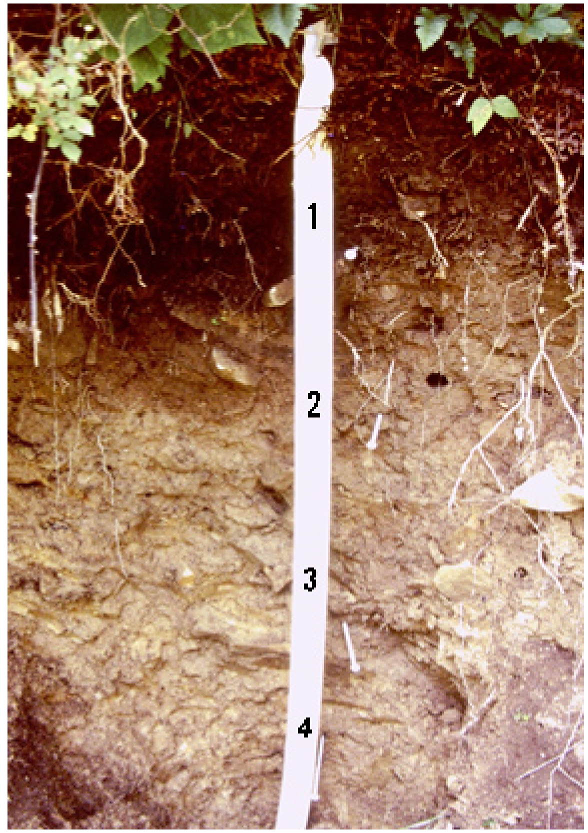


Tape units: feet. Photo: D. McIntosh

Grigsby

The Grigsby series consists of very deep, well drained soils that formed in mixed alluvium derived from sandstone, shale, siltstone and limestone. They are on low stream terraces, flood plains, and natural levees. Slopes range from 0 to 20 percent.

TAXONOMIC CLASS: Coarse-loamy, mixed, active, mesic Dystric Fluventic Eutrudepts



Tape units: feet. Photo: D. McIntosh

Guyandotte

The Guyandotte series consists of very deep, well drained soils that formed in colluvium from acid and neutral sandstones, shales, and siltstones. They are on backslopes and footslopes of coves and drainageways. Slopes range from 35 to 90 percent.

TAXONOMIC CLASS: Loamy-skeletal, mixed, active, mesic Typic Humudepts

Tape units: feet. Photo: USDA- NRCS

Hayter

The Hayter series consists of very deep and well drained soils that formed in colluvium weathered from sandstone, shale and limestone. They are on colluvial fans, benches, lower backslopes, footslopes, and toeslopes. Slopes range from 0 to 60 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, active, mesic Ultic Hapludalfs

Tape units: feet. Photo: USDA- NRCS

Handshoe

The Handshoe series consists of very deep, well drained soils that formed in colluvium of sandstone, shale, and siltstone. They are found on side slopes or head slopes of mountains. Permeability is moderately rapid. Slopes range from 20 to 90 percent.

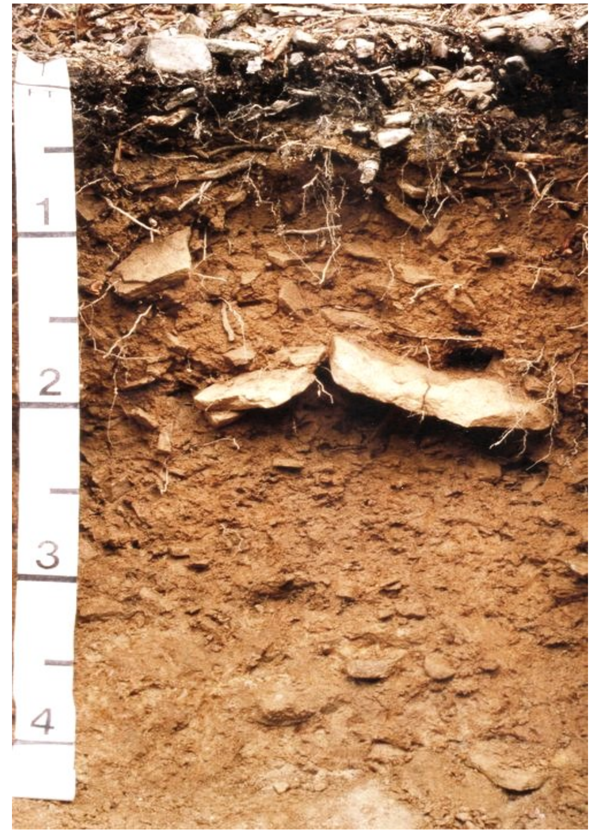
TAXONOMIC CLASS: Loamy-skeletal, mixed, semiactive, mesic Typic Dystrudepts

Tape units: feet. Photo: USDA- NRCS

Helechawa

The Helechawa series consists of deep and very deep, somewhat excessively drained soils that formed in loamy colluvium weathered dominantly from sandstone. They are on side slopes, benches, and foot slopes of hillsides and mountainsides. Permeability is moderately rapid. Slopes range from 5 to 75 percent.

TAXONOMIC CLASS: Coarse-loamy, siliceous, semiactive, mesic Typic Dystrudepts



Tape units: feet. Photo: D. McIntosh

Highsplint

The Highsplint series consists of deep and very deep, well drained soils that formed in stony, loamy colluvium weathered from sandstone, siltstone, and shale. They are on side slopes and foot slopes of mountains and hills and on colluvial fans at the mouths of drainageways. Slopes range from 5 to 100 percent.

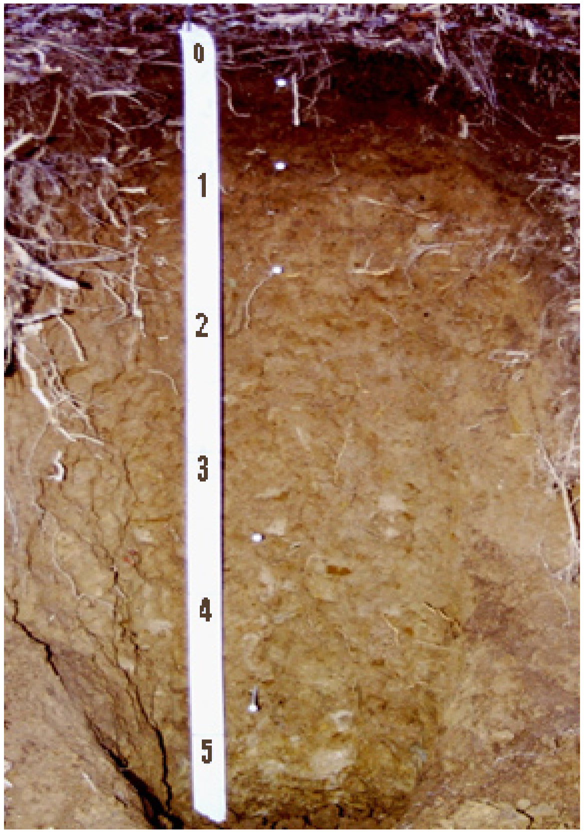
TAXONOMIC CLASS: Loamy-skeletal, mixed, active, mesic Typic Dystrudepts

Tape units: feet. Photo: D. McIntosh

Kaymine

The Kaymine series consists of very deep, well drained soils that formed in surface coal mine regolith derived from siltstone, sandstone, shale, and coal. They are on summits, shoulders, back slopes, footslopes, and toeslopes of hillslopes, ridges and mountain sides. Slopes range from 0 to 80 percent.

TAXONOMIC CLASS: Loamy-skeletal, mixed, active, nonacid, mesic Typic Udorthents



Tape units: feet. Photo: D. McIntosh

Kimper

The Kimper series consists of deep and very deep, well drained soils that formed in loamy colluvium or colluvium and residuum weathered from sandstone, siltstone and shale. Permeability is moderate to moderately rapid. They are mostly in coves and on foot slopes and benches of mountain sides. Slopes range from 5 to 95 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, semiactive, mesic Humic Dystrudepts

Tape units: feet. Photo: A.D. Karathanasis

Latham

The Latham series consists of moderately deep, moderately well drained soils that formed in residuum from soft acid shale or in some areas siltstone. These soils are on backslopes, shoulders, or summits of uplands. Slopes range from 0 to 35 percent.

TAXONOMIC CLASS: Fine, mixed, semiactive, mesic Aquic Hapludults

Tape units: feet. Photo: USDA- NRCS

Marrowbone

The Marrowbone series consists of moderately deep, well drained soils that formed in sandstone and siltstone residuum. These soils are on upland summits, shoulders, and backslopes. Slopes range from 8 to 120 percent.

TAXONOMIC CLASS: Coase-loamy, mixed, semiactive, mesic Typic Dystrudepts

Tape units feet. Photo: A. D. Karathanasis

Philo

The Philo series consists of very deep, moderately well drained soils that formed in recent alluvium derived mainly from sandstone and shale. Permeability is moderate to moderately rapid. These soils are on nearly level flood plains. Slopes range from 0 to 6 percent.

TAXONOMIC CLASS: Coarse-loamy, mixed, active, mesic Fluvaquentic Dystrudepts

Tape units: feet. Photo: D. McIntosh

Pope

The Pope series consists of very deep, well drained soils that formed in alluvium weathered from acid sandstone, siltstone, and shale. Permeability is moderate or moderately rapid. They are on flood plains. Slopes range from 0 to 4 percent.

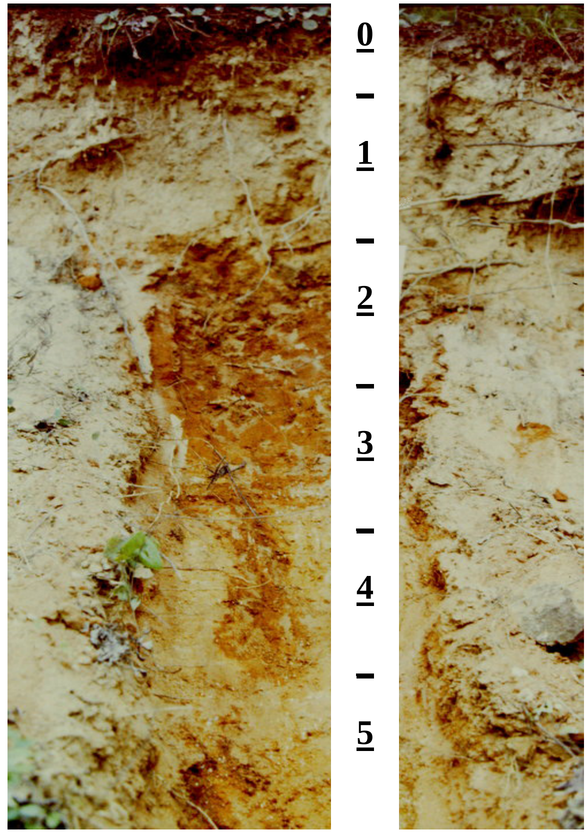
TAXONOMIC CLASS: Coarse-loamy, mixed, active, mesic Fluventic Dystrudepts

Tape units: metric. Photo: USDA- NRCS

Ramsey

The Ramsey series consists of shallow and very shallow, somewhat excessively drained soils that formed in residuum or colluvium weathered from sandstone or quartzite. They are on plateaus and upper side slopes of hills and mountains. Slopes range from 8 to 70 percent.

TAXONOMIC CLASS: Loamy, siliceous, subactive, mesic Lithic Dystrudepts



Tape units feet. Photo: A. D. Karathanasis

Rayne

The Rayne series consists of deep and very deep, well drained soils that formed in residuum from interbedded shale, siltstone and some fine grained sandstone. These soils are on summits, shoulders, and backslopes of uplands. Slopes range from 0 to 60 percent.

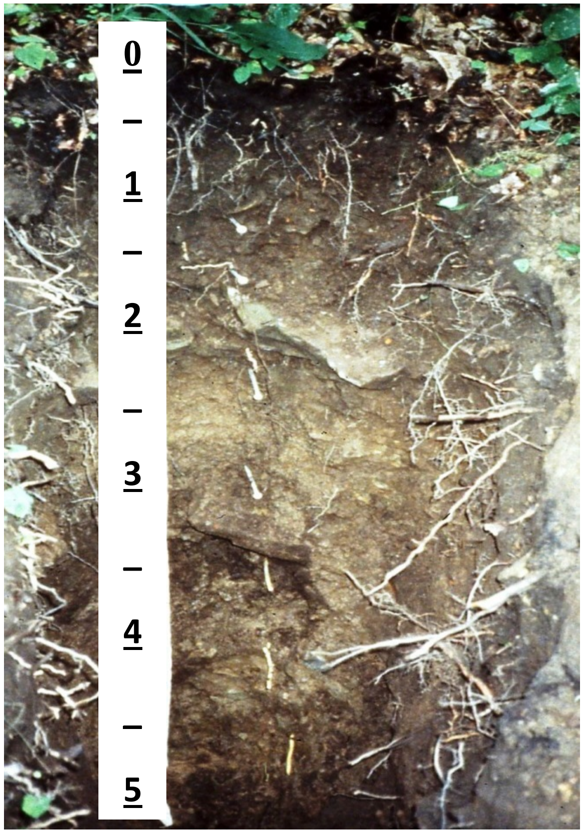
TAXONOMIC CLASS: Fine-loamy, mixed, active, mesic Typic Hapludults

Tape units: feet. Photo: D. McIntosh

Sequoia

The Sequoia series consists of moderately deep, well drained soils with moderately slow permeability. These soils formed in residuum of acid shale and siltstone. They are on gently rolling to very steep hillsides and ridges. Slopes range from 2 to 65 percent.

TAXONOMIC CLASS: Fine, mixed, semiactive, mesic Typic Hapludults

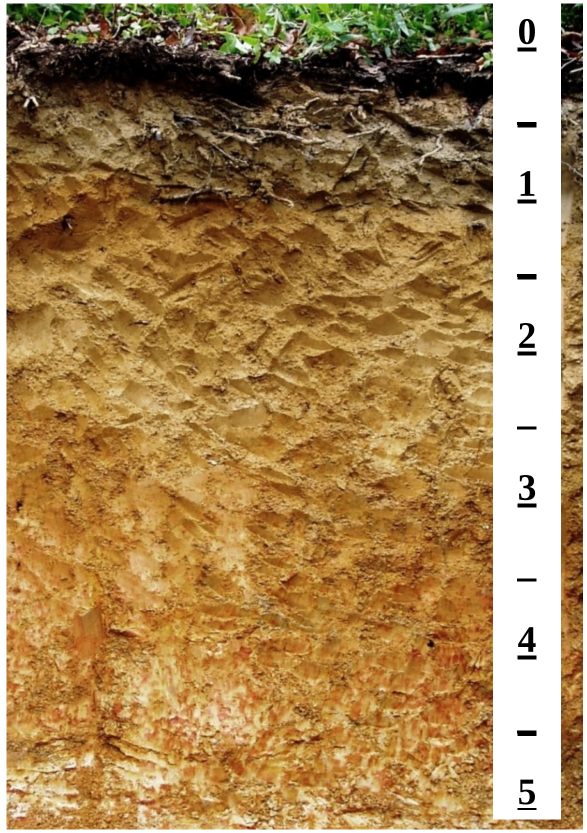


Tape units: feet. Photo: USDA- NRCS

Sharondale

The Sharondale series consists of very deep, well drained soils that formed in loamy colluvium weathered from strongly acid to neutral sandstone, siltstone, and shale. Permeability is moderately rapid. These soils are in coves or on mountain sides on north and east facing slopes. Slopes range from 15 to 100 percent.

TAXONOMIC CLASS: Loamy-skeletal, mixed, active, mesic Typic Hapludolls

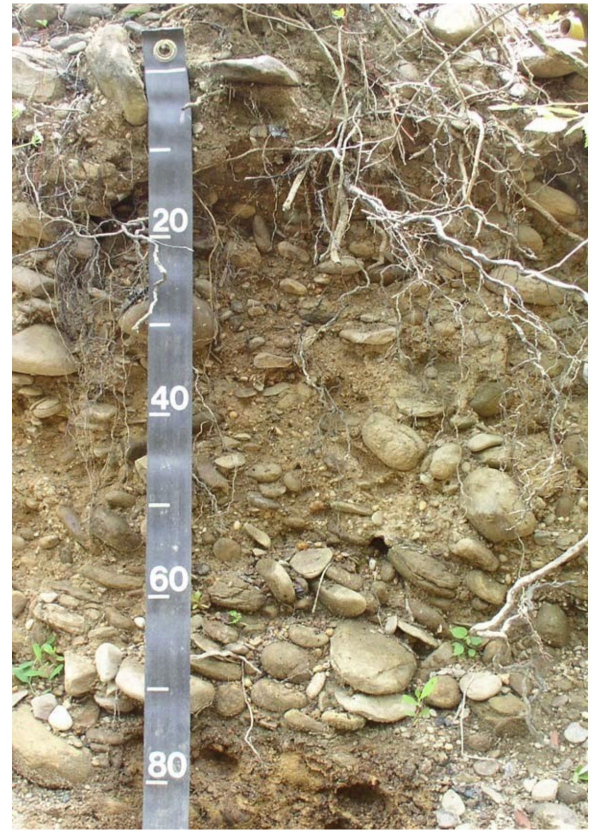


Tape units: feet. Photo: S. Blanford

Shelocta

The Shelocta series consists of deep and very deep, well drained, moderately permeable soils that formed in mixed colluvium or colluvium and residuum weathered from shale, siltstone, and sandstone. They are on gently sloping to very steep upland areas, foot slopes, and benches. Slopes range from 2 to 90 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, active, mesic Typic Hapludults



Tape units: metric. Photo: USDA- NRCS

Skidmore

The Skidmore series consists of deep and very deep, well drained to somewhat excessively drained soils that formed in gravelly, cobbly, or channery alluvium weathered primarily from sandstone, siltstone and limestone. They are on narrow flood plains. Slopes range from 0 to 4 percent.

TAXONOMIC CLASS: Loamy-skeletal, mixed, semiactive, mesic Dystric Fluventic Eutrudepts

Tape units: metric. Photo: D. McIntosh

Tilsit

The Tilsit series consists of deep or very deep, moderately well drained soils with a fragipan. They formed in silty residuum from interbedded acid siltstone, soft shale, or fine grained sandstone. These soils are on summits or shoulders of ridges. Slopes range from 0 to 15 percent.

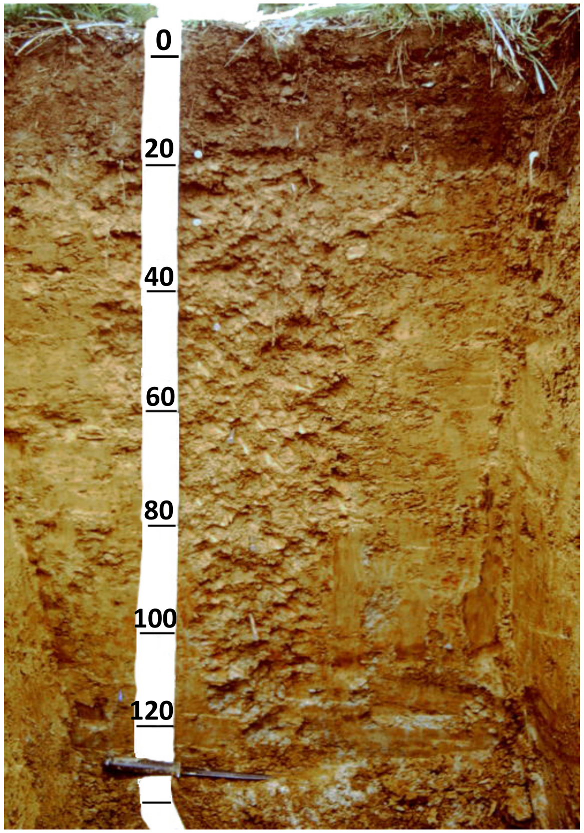
TAXONOMIC CLASS: Fine-silty, mixed, semiactive, mesic Typic Fragiudults

Tape units: feet. Photo: USDA- NRCS

Wernock

The Wernock series consists of moderately deep, well drained soils that formed in residuum from acid siltstones, shales, and sandstone. Permeability is moderate. These soils are on narrow upland ridges. Slopes range from 2 to 20 percent.

TAXONOMIC CLASS: Fine-silty, mixed, semiactive, mesic Typic Hapludults



Tape units: metric. Photo: USDA-NRCS

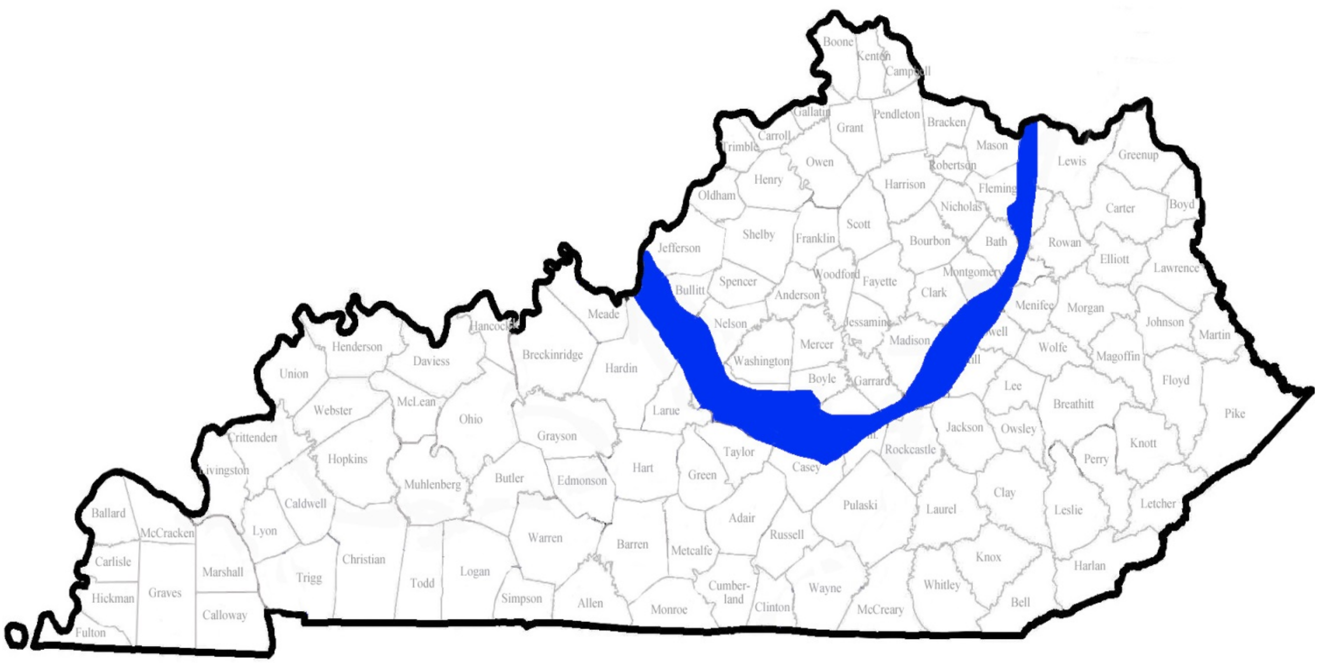
Whitley

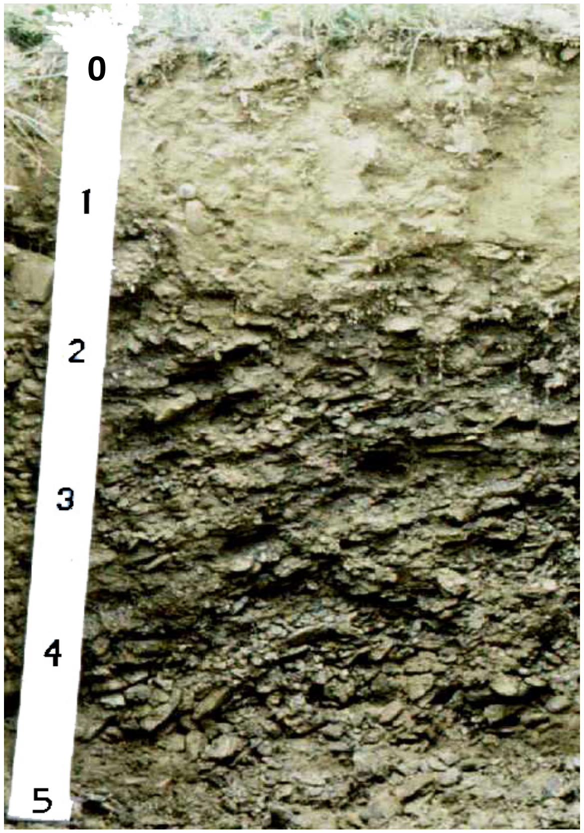
The Whitley series consists of very deep, well drained, moderately permeable soils that formed in mixed alluvium weathered from siltstone, shale and sandstone. They are found on stream terraces, foot slopes and alluvial fans. Slopes range from 0 to 12 percent.

TAXONOMIC CLASS: Fine-silty, mixed, semiactive, mesic Typic Hapludults

Knobs Region

MLRA 121, 124 and 125



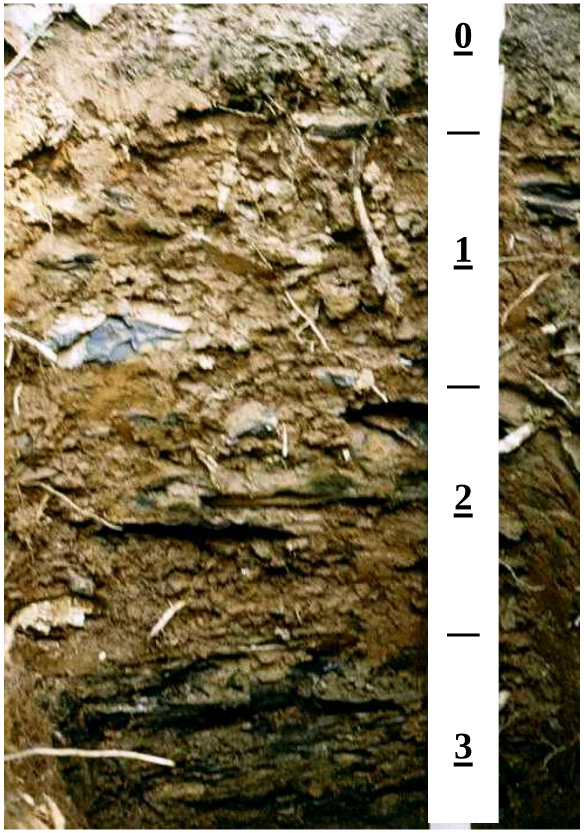


Tape units: feet. Photo: A.D. Karathanasis

Clifty

The Clifty series consists of very deep well-drained soils that formed in mixed alluvium derived from siltstones, sandstones, shales, and loess. These soils are on level or nearly level flood plains. Slopes range from 0 to 4 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, active, mesic Fluventic Dystrudepts



Tape units: feet. Photo: A.D. Karathanasis

Colyer

The Colyer series consists of shallow, well drained, slowly permeable soils that formed in clayey residuum of weathered, black, highly fissile, bituminous shale. These sloping to very steep soils are on uplands. Slopes range from 6 to 60 percent.

TAXONOMIC CLASS: Clayey-skeletal, mixed, semiactive, mesic Lithic Dystrudepts

Tape units: inches. Photo: USDA-NRCS

Culleoka

The Culleoka series consists of moderately deep, well drained, soils that formed in colluvium or residuum from siltstone or interbedded shale, limestone, siltstone, and fine grained sandstone. They are on steep upland hillsides and narrow ridge crests. Slopes range from 2 to 70 percent.

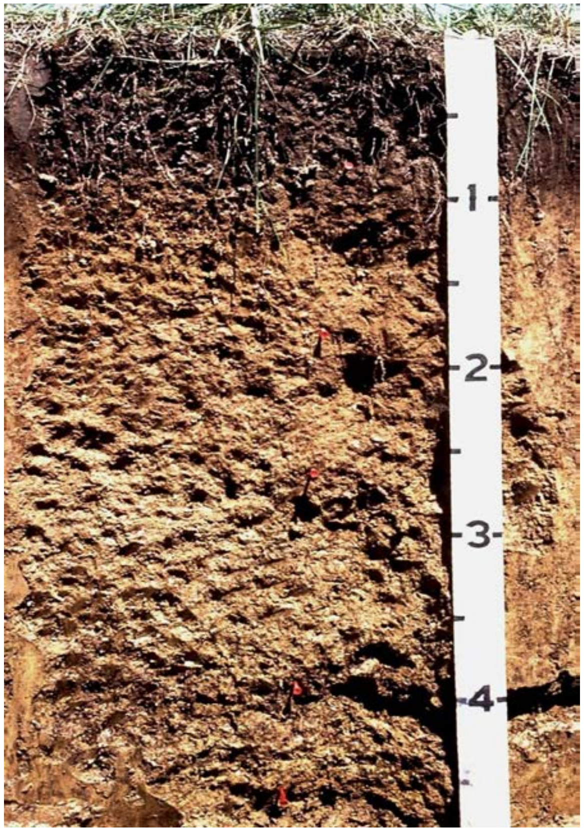
TAXONOMIC CLASS: Fine-loamy, mixed, active, mesic Ultic Hapludalfs

Tape units: feet. Photo: A.D. Karathanasis

Garmon

The Garmon series consists of moderately deep, well drained soils on shoulder slopes and steep hillsides of highly dissected uplands. These soils formed in residuum of calcareous shale, siltstone, and limestone. Slopes range from 2 to 80 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, semiactive, mesic Dystric Eutrudepts



Tape units: feet. Photo: USDA-NRCS

Monongahela

The Monongahela series consists of very deep, moderately well drained soils with a fragipan. These soils formed in old alluvium from soils derived largely from acid sandstone and shale. They are on toeslopes of terraces. Slopes range from 0 to 25 percent.

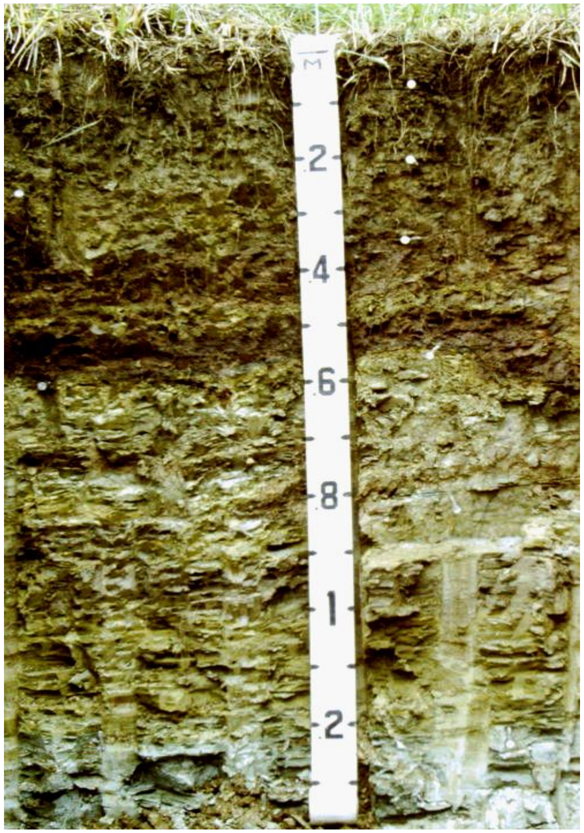
TAXONOMIC CLASS: Fine-loamy, mixed, semiactive, mesic Typic Fragiudults

Tape units: feet. Photo: A.D. Karathanasis

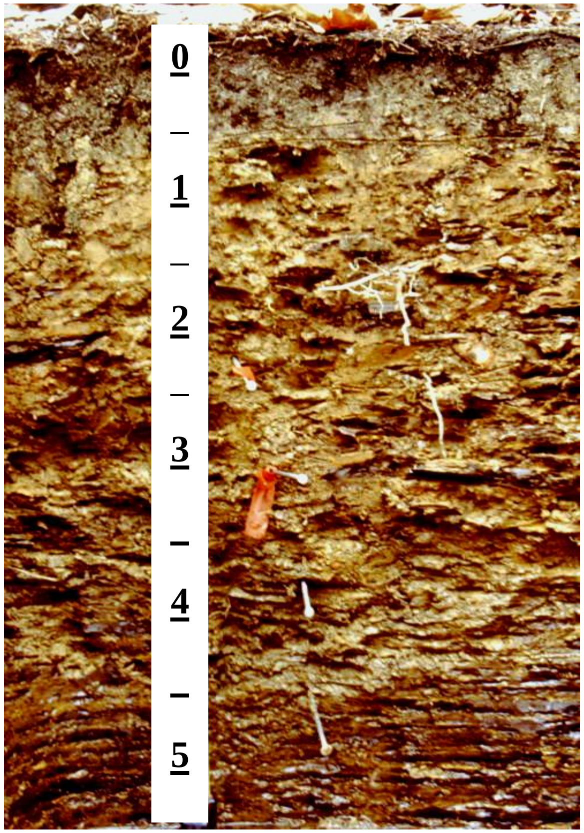
Muse

The Muse series consists of deep and very deep, well drained soils that formed in residuum or colluvium weathered from acid shale or siltstone. Permeability is slow. These soils are on side slopes, foot slopes, and benches on uplands. Slopes range from 2 to 60 percent.

TAXONOMIC CLASS: Fine, mixed, semiactive, mesic Typic Hapludults



Tape units: metric   Photo: A.D. Karathanasis



Tape units: feet.   Photo: USDA- NRCS

Shrouts

The Shrouts series consists of moderately deep, well drained soils that formed in residuum of calcareous shale interbedded with dolomitic siltstone. These soils are on upland ridges and sideslopes. Slopes range from 2 to 50 percent.

TAXONOMIC CLASS: Fine, mixed, active, mesic Typic Hapludalfs

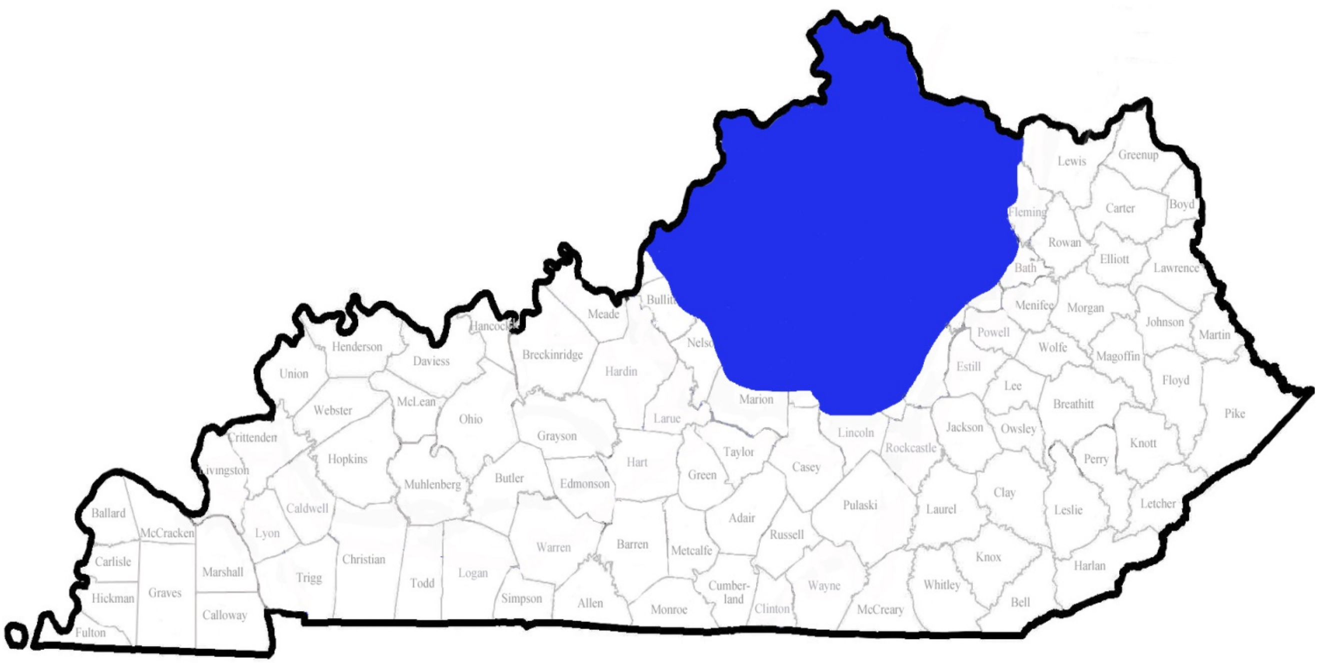
Trappist

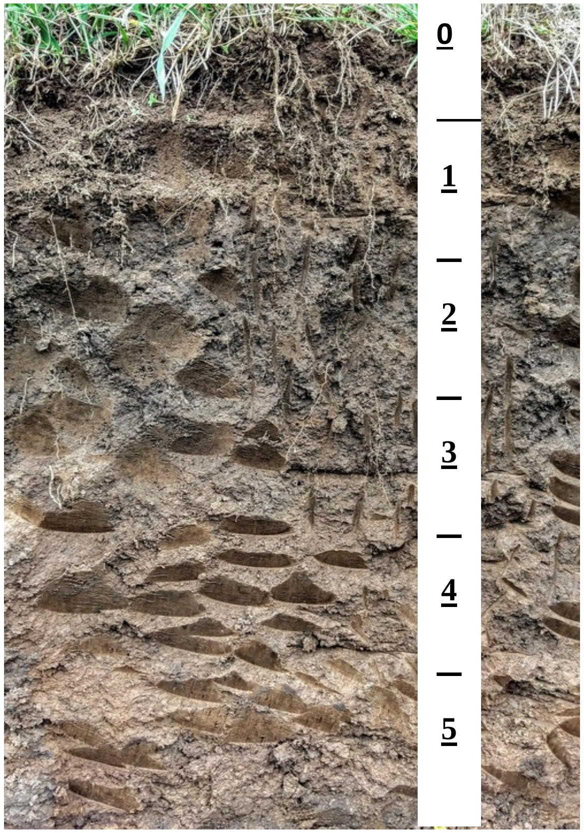
The Trappist series consists of moderately deep, well drained soils that formed in residuum weathered from acid shale. They are on ridgetops, side slopes, and benches. Slopes range from 2 to 60 percent.

TAXONOMIC CLASS: Fine, mixed, semiactive, mesic Typic Hapludults

Bluegrass Region

MLRA 121



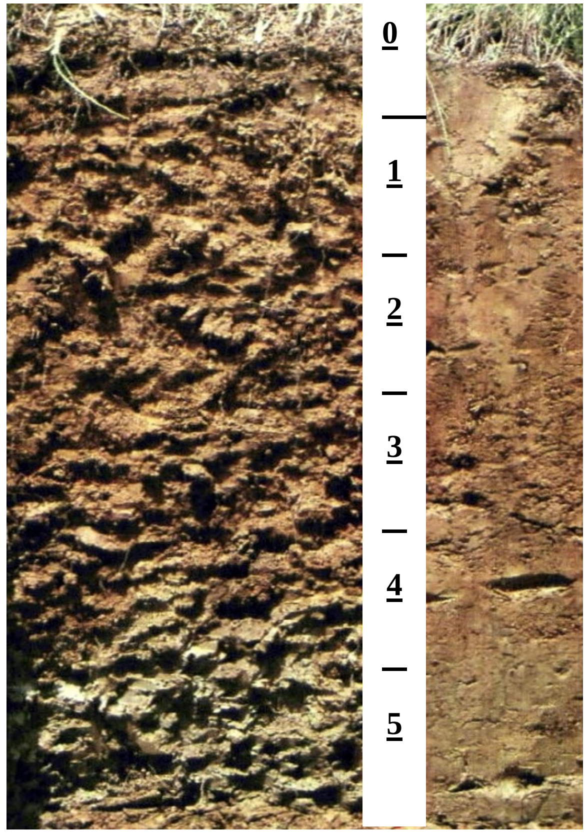


Tape units: feet. Photo: A.D. Karathanasis

Ashton

The Ashton series consists of very deep, well drained, moderately permeable soils that formed in loamy alluvium derived from limestone or partly in residuum from limestone. These soils are on low stream terraces and alluvial fans. Slopes range from 0 to 15 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Mollic Hapludalfs

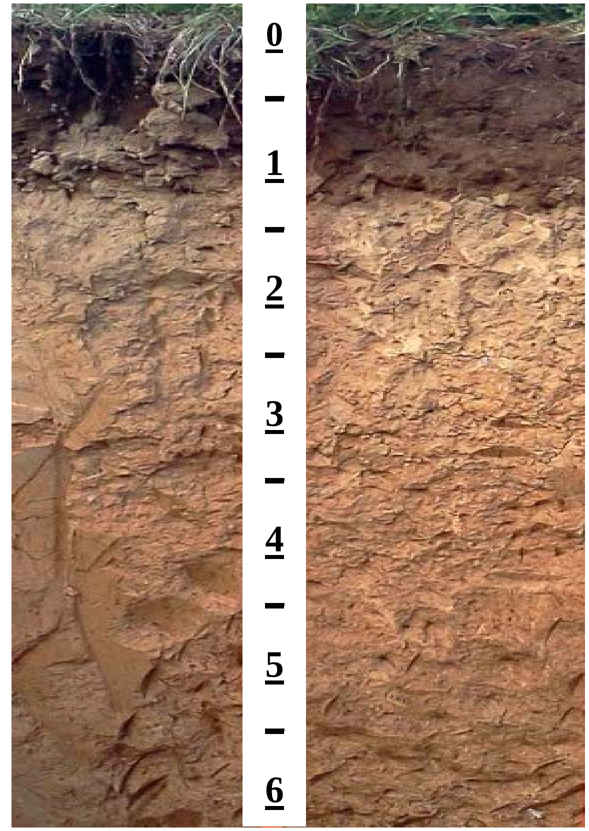


Tape units: feet. Photo: USDA-NRCS

Beasley

The Beasley series consists of deep, well drained soils that formed in residuum from soft calcareous shale, siltstone, and limestone. Permeability is moderately slow. These soils are on ridges and sideslopes. Slopes range from 2 to 60 percent.

TAXONOMIC CLASS: Fine, mixed, active, mesic Typic Hapludalfs

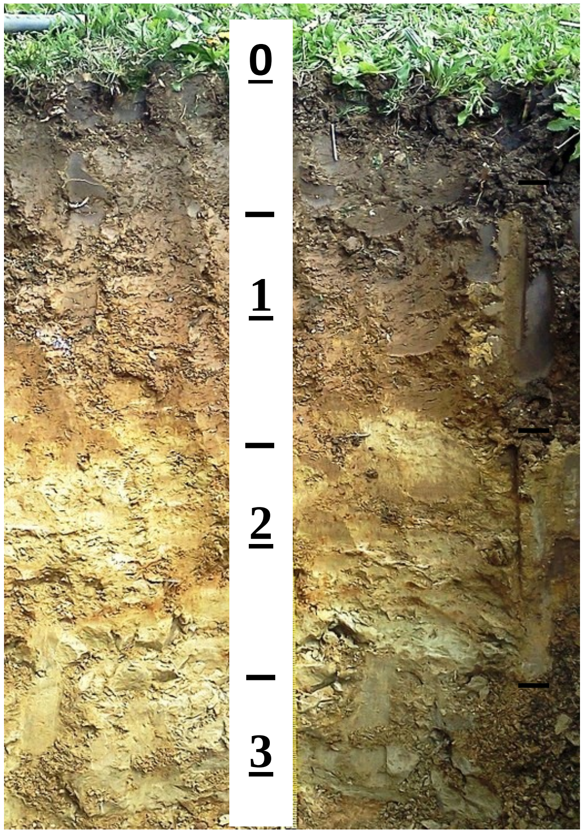


Tape units: feet. Photo: A.D. Karathanasis

Bluegrass

The Bluegrass series consists of very deep, well drained, moderately permeable soils that formed in silty material over residuum weathered from phosphatic limestone. These soils are on nearly level to moderately steep uplands. Slopes range from 0 to 20 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Typic Paleudalfs

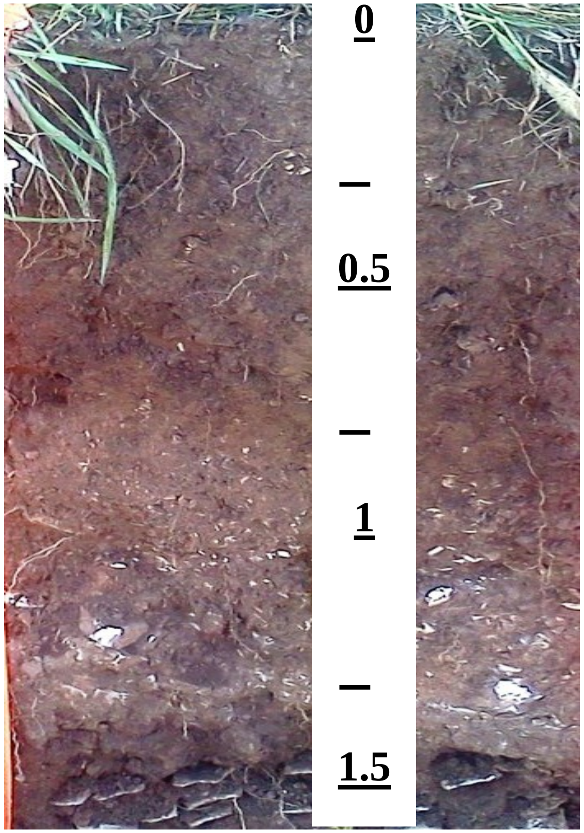


Tape units: feet. Photo: A.D. Karathanasis

Eden

The Eden series consists of moderately deep, well drained, slowly permeable soils that formed in residuum from interbedded calcareous shale, siltstone, and limestone. These soils are on hillsides and narrow ridgetops. Slopes range from 2 to 70 percent.

TAXONOMIC CLASS: Fine, mixed, active, mesic Typic Hapludalfs

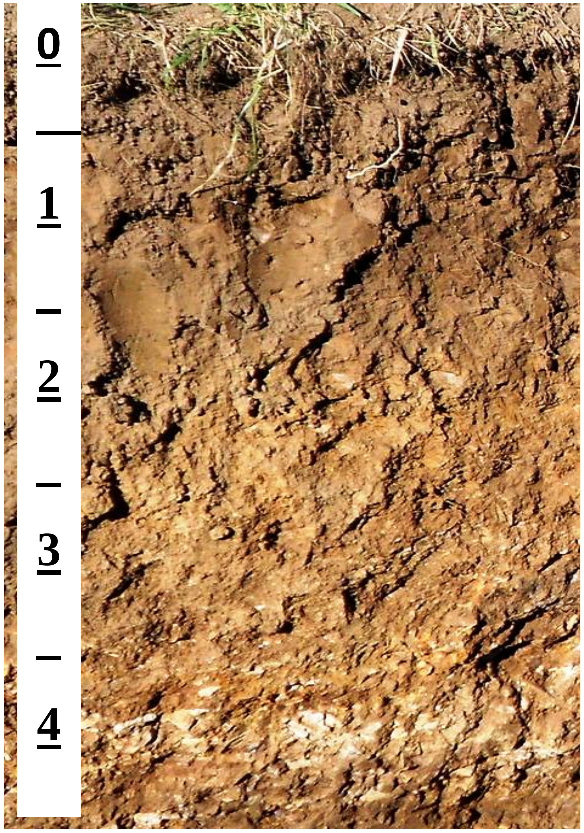


Tape units: feet. Photo: A.D. Karathanasis

Fairmount

The Fairmount series consists of shallow, well drained, slowly permeable soils that formed in limestone residuum interbedded with thin layers of calcareous shales. These soils are on hillsides and narrow ridges. Slopes range from 2 to 60 percent.

TAXONOMIC CLASS: Clayey, mixed, active, mesic Lithic Hapludolls

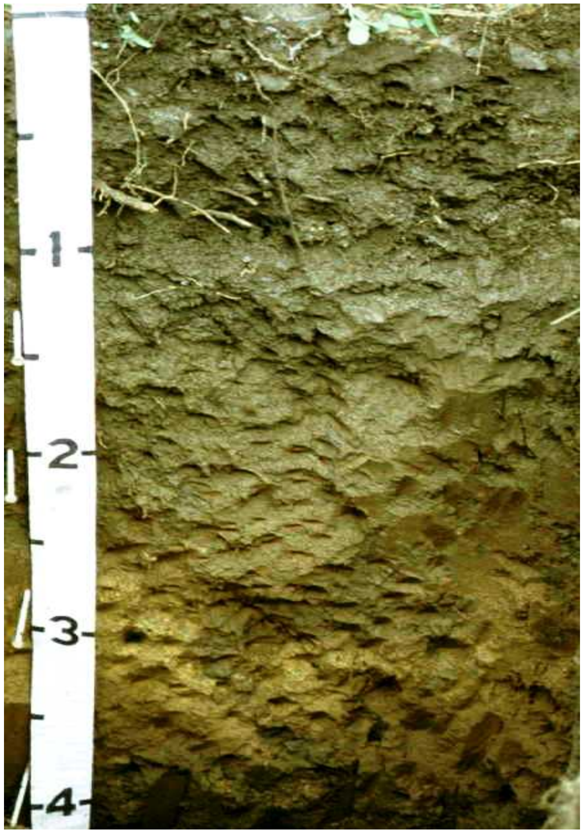


Tape units: feet. Photo: A.D. Karathanasis

Faywood

The Faywood series consists of moderately deep, well drained soils that formed in limestone residuum interbedded with thin layers of shale. These soils are on ridgetops and side slopes of dissected uplands. Slopes range from 2 to 60 percent.

TAXONOMIC CLASS: Fine, mixed, active, mesic Typic Hapludalfs

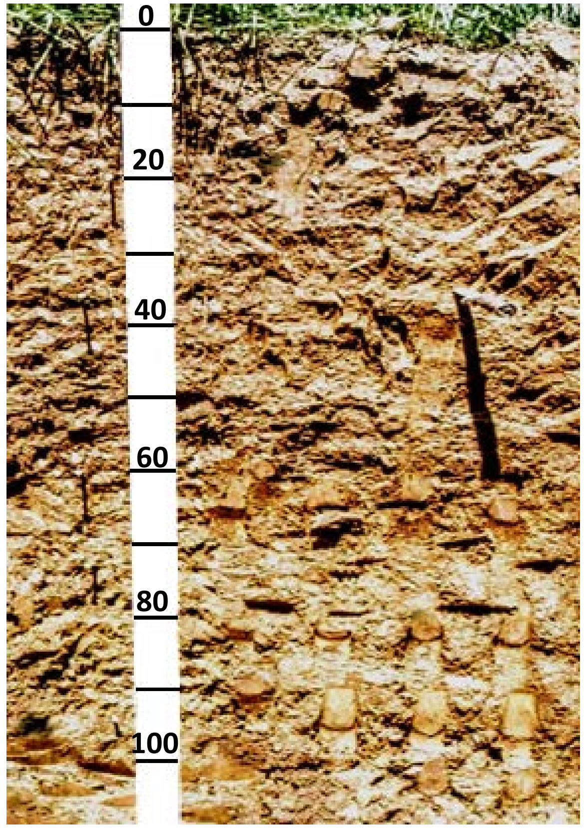


Tape units: feet. Photo: A.D. Karathanasis

Huntington

The Huntington series consists of very deep, well drained soils that formed in alluvium washed from shale, sandstone, and limestone. These soils are on floodplains in river valleys. Slopes range from 0 to 15 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Fluventic Hapludolls

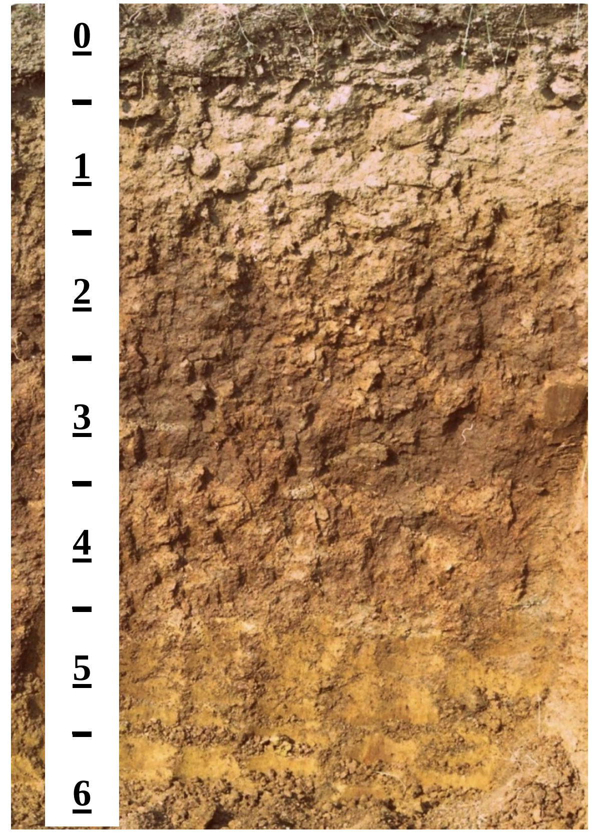


Tape units: metric. Photo: USDA- NRCS

Lowell

The Lowell series consists of deep and very deep, well drained soils that formed in limestone residuum interbedded with thin layers of shale. These soils are on upland ridgetops and sideslopes or footslopes and benches. Slopes range from 2 to 65 percent.

TAXONOMIC CLASS: Fine, mixed, active, mesic Typic Hapludalfs

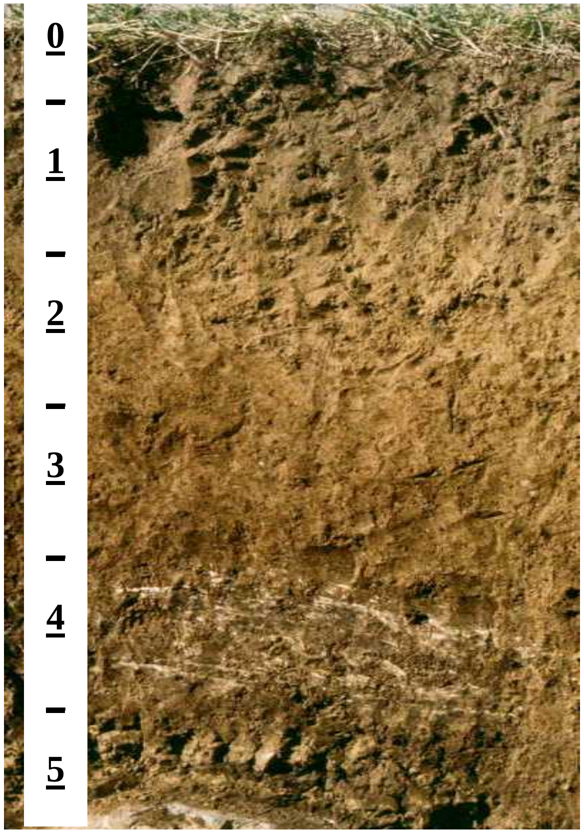


Tape units: feet. Photo: A.D. Karathanasis

Maury

The Maury series consists of very deep, well drained, moderately permeable soils that formed in silty material over residuum weathered from phosphatic limestone. These soils are on nearly level to moderately steep uplands. Slopes range from 0 to 20 percent.

TAXONOMIC CLASS: Fine, mixed, active, mesic Typic Paleudalfs

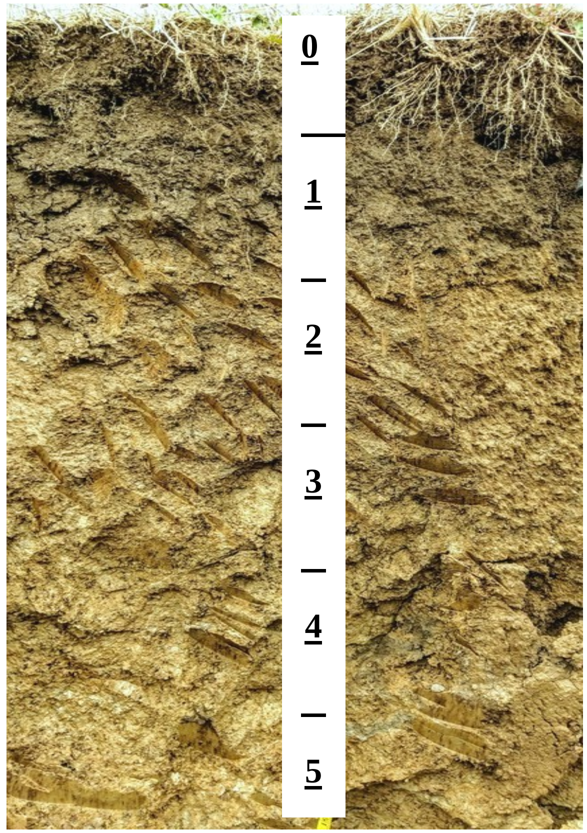


Tape units: feet.   Photo: A.D. Karathanasis

McAfee

The McAfee series consists of moderately deep, well drained soils that formed in residuum weathered from phosphatic limestone. These soils are on gently sloping to steep uplands. Slopes range from 2 to 50 percent.

TAXONOMIC CLASS: Fine, mixed, active, mesic Mollic Hapludalfs

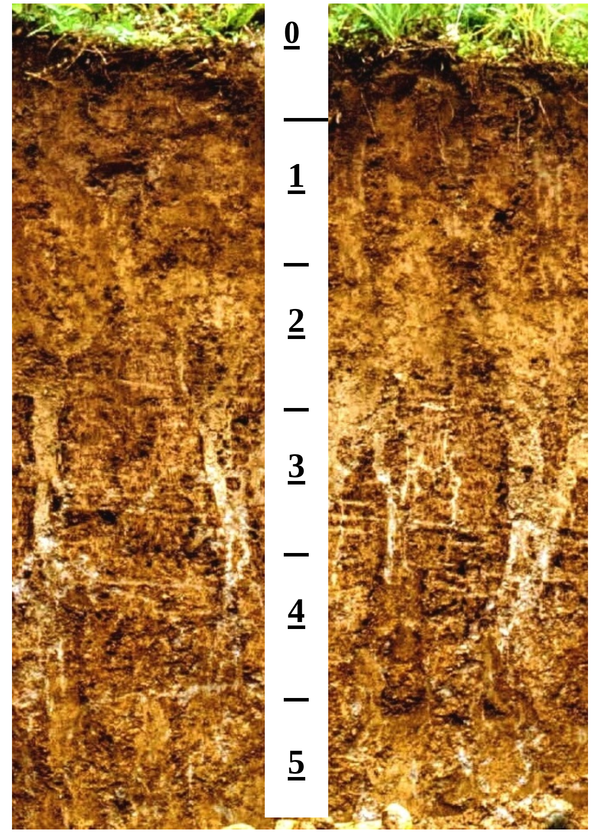


Tape units: feet.   Photo: A.D. Karathanasis

McGary

The McGary series consists of very deep, somewhat poorly drained soils that formed in loess underlain by calcareous, fine-textured lacustrine deposits. These soils are on lake plains and less commonly on flood-plain steps. Slopes range from 0 to 10 percent.

TAXONOMIC CLASS: Fine, mixed, active, mesic Aeric Epiaqualfs

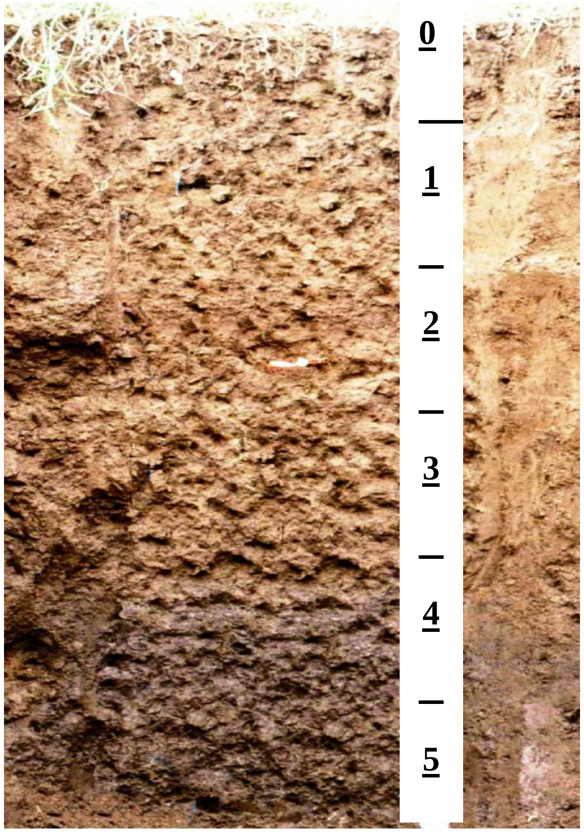


Tape units: feet.   Photo: A.D. Karathanasis

Nicholson

The Nicholson series consists of very deep, moderately well drained soils with a slowly permeable fragipan. These soils formed in a mantle of loess or silty material underlain by a residuum of limestone, calcareous shale, and siltstone. They are on nearly level to rolling upland ridgetops and shoulder slopes. Slopes range from 0 to 20 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Oxyaquic Fragiudalfs

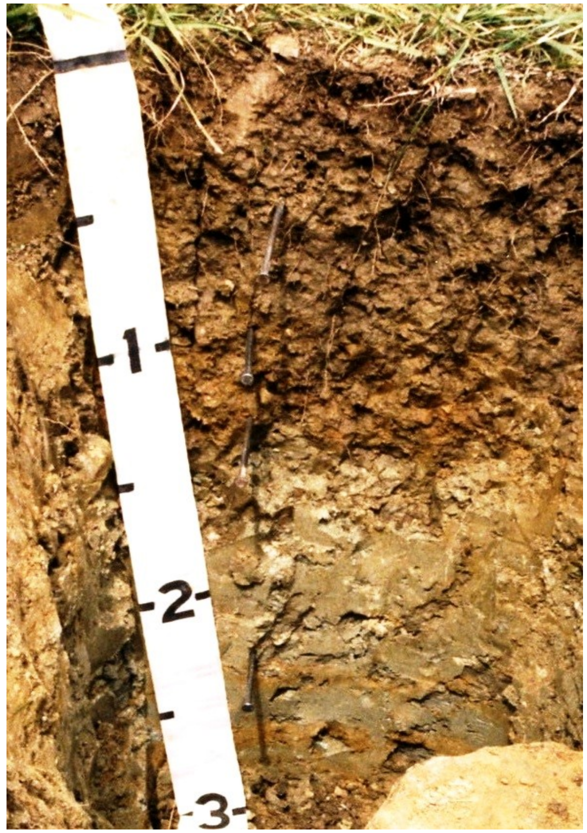


Tape units: feet. Photo: A.D. Karathanasis

Nolin

The Nolin series consists of very deep, well drained soils formed in alluvium derived from limestone, sandstone, siltstone, shale, and loess. These soils are on nearly level flood plains, in concave depressions, or on natural levees of major rivers and streams. Slopes range from 0 to 25 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Dystric Fluventic Eutrudepts



Tape units: feet. Photo: USDA- NRCS

Otwood

The Otwood series consists of very deep, moderately well drained soils with a fragipan. These soils formed in a mixture of loess and silty alluvium and the underlying clayey or loamy residuum of shale, siltstone, sandstone, or limestone. They are on nearly level to moderately steep stream and river terraces. Slopes range from 0 to 25 percent.

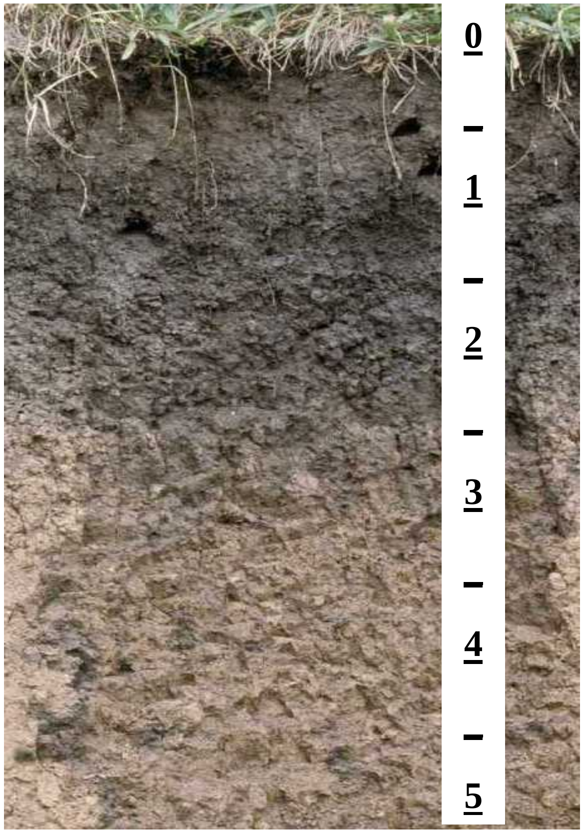
TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Oxyaquic Fragiudalfs

Tape units: feet. Photo: USDA- NRCS

Wheeling

The Wheeling series consists of very deep, well drained soils that formed in loamy alluvium over sandy and gravelly glaciofluvial deposits. These soils are on terraces. Slopes range from 0 to 55 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, active, mesic Ultic Hapludalfs



Tape units: feet. Photo: A.D. Karathanasis

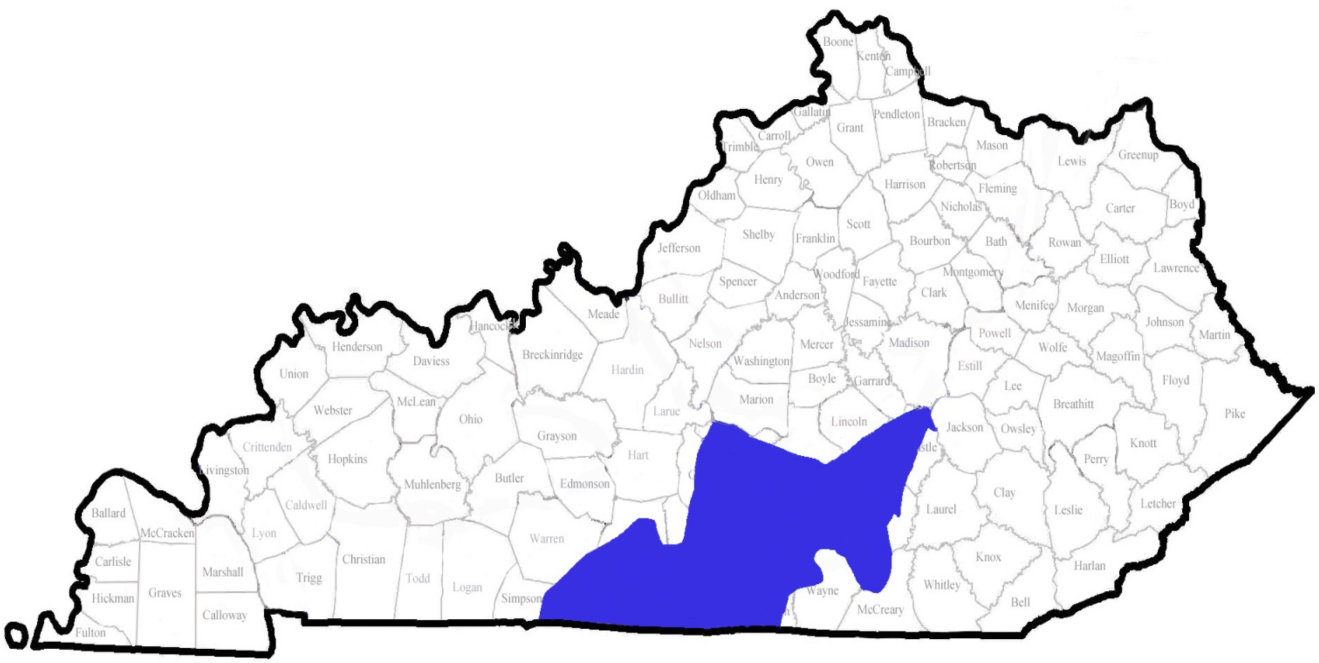
Woolper

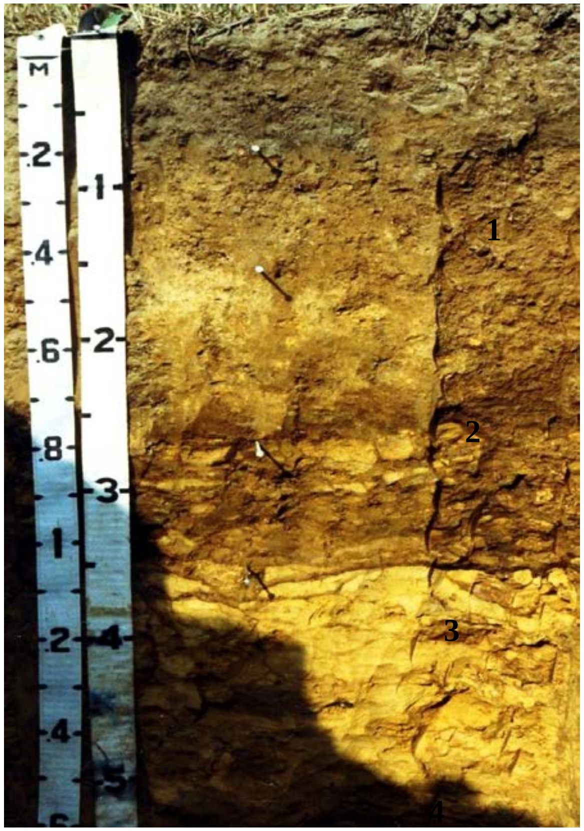
The Woolper series consists of deep, well-drained soils that formed in colluvium or alluvium from soils of limestone and shale origin. These soils are on footslopes and fans. Slopes range from 0 to 50 percent.

TAXONOMIC CLASS: Fine, mixed, active, mesic Typic Argiudolls

Eastern Pennyroyal

MLRA 122



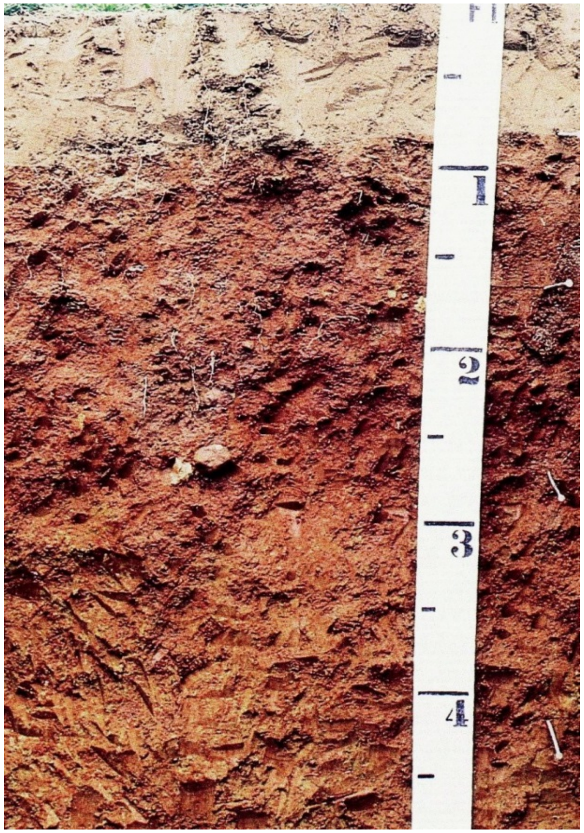


Tape units: metric, feet. Photo: USDA-NRCS

Frankstown

The Frankstown series consists of deep and very deep, well drained soils that formed in residuum weathered from siliceous limestone and interbedded limy shale, siltstone, sandstone or chert. Permeability is moderate. They are on gently sloping to steep uplands in limestone valleys. Slopes range from 2 to 35 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, semiactive, mesic Typic Hapludults

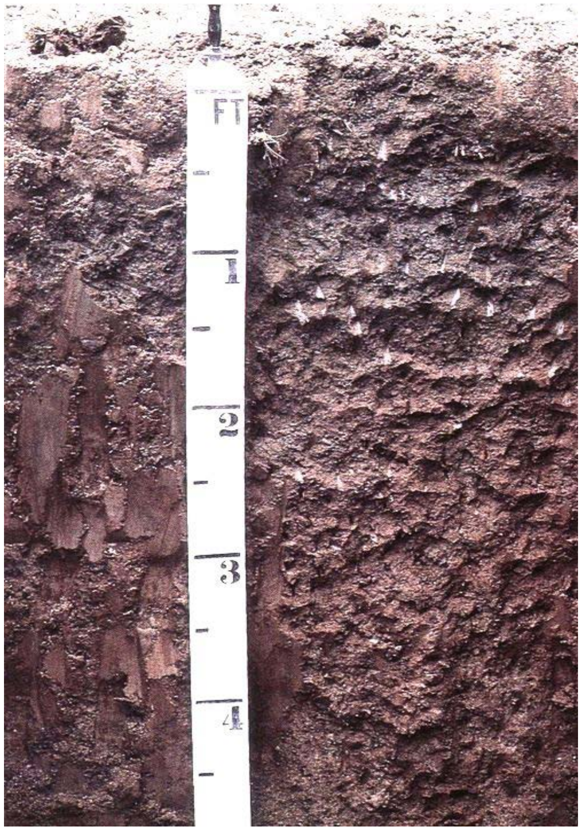


Tape units: feet. Photo: USDA-NRCS

Frederick

The Frederick series consists of very deep, well drained soils that formed in clayey residuum derived from dolomitic limestone with a small component of sandstone, siltstone, and shale. They are on are convex shaped uplands and are sloping to very steep. Permeability is moderate. Slopes range from 0 to 60 percent.

TAXONOMIC CLASS: Fine, mixed, semiactive, mesic Typic Paleudults

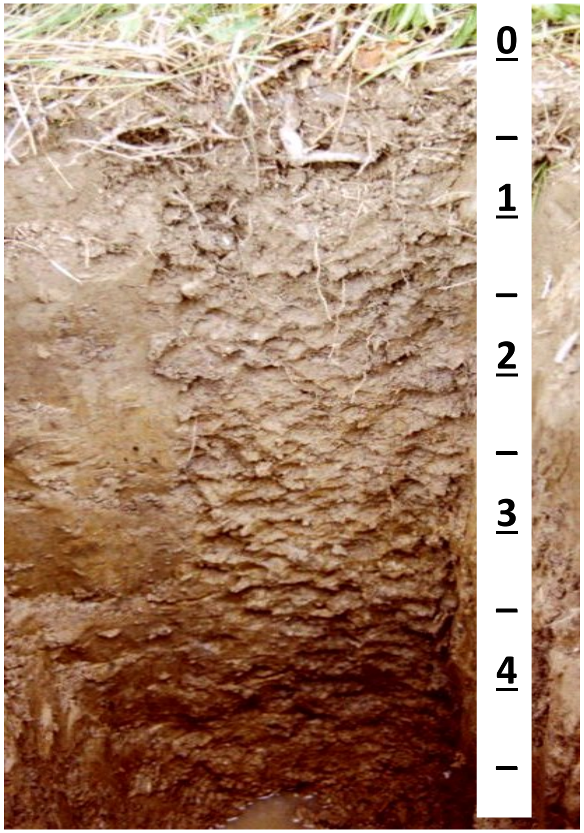


Tape units: feet. Photo: USDA-NRCS

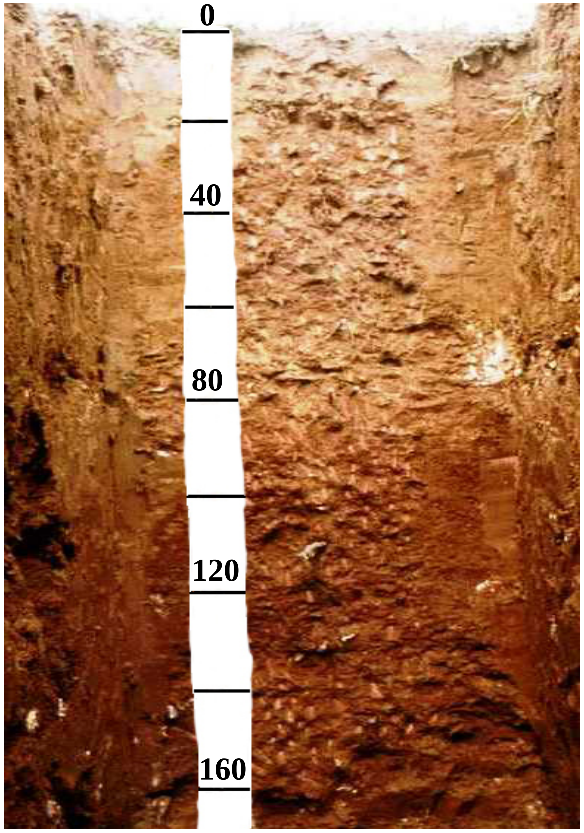
Huntington

The Huntington series consists of very deep, well drained soils that formed in alluvium washed from shale, sandstone, and limestone. These soils are on floodplains in river valleys. Slopes range from 0 to 15 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Fluventic Hapludolls



Tape units: feet. Photo: USDA-NRCS



Tape units: metric. Photo: A.D. Karathanasis

Tape units: feet. Photo: USDA-NRCS

Newark

The Newark series consists of very deep, somewhat poorly drained soils that formed in mixed alluvium derived from limestone, shale, siltstone, sandstone, and loess. These soils are on nearly level flood plains and in upland depressions. Slopes range from 0 to 3 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, nonacid, mesic Fluventic Endoaquepts

Pricetown

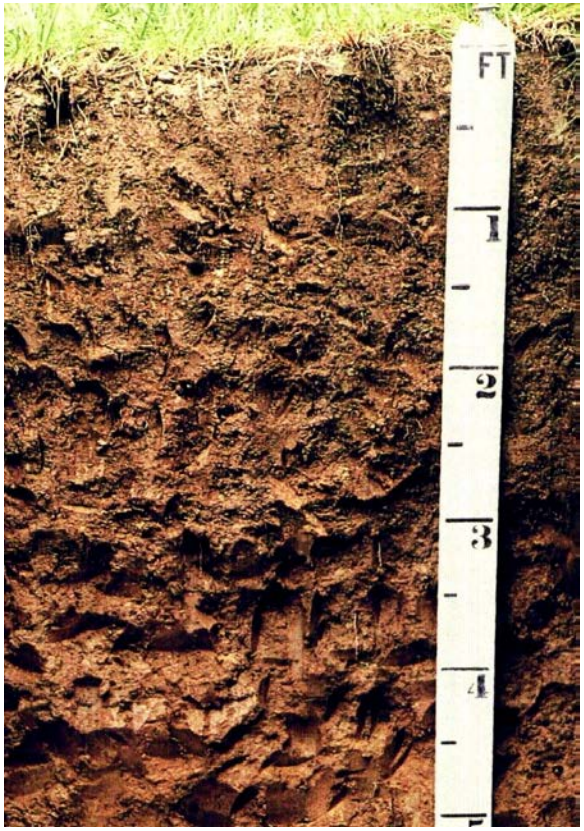
The Pricetown series consists of deep, well drained moderately permeable soils that formed in a silty mantle over residuum from cherty limestone. These soils are on nearly level to sloping uplands. Slopes range from 0 to 12 percent.

TAXONOMIC CLASS: Fine-silty, siliceous, semiactive, mesic Typic Paleudults

Purdy

The Purdy series consists of very deep, poorly drained or very poorly drained soils that formed in slackwater-deposited alluvium comprised of massive silty clay with occasional lenses of coarser material. These soils are on nearly level to gently sloping terraces. Slopes range from 0 to 8 percent.

TAXONOMIC CLASS: Fine, mixed, active, mesic Typic Endoaquults

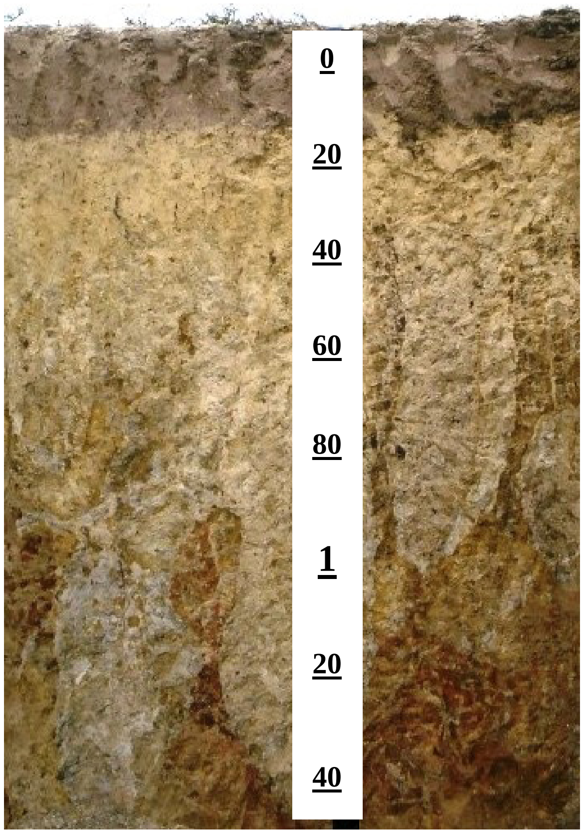


Tape units: feet. Photo: USDA-NRCS

Renox

The Renox series consists of very deep, well drained, moderately permeable soils that formed in loamy colluvium or alluvium from interbedded siltstone, shale, limestone, and sandstone. These soils are on foot slopes, lower side slopes, toe slopes, benches, and alluvial fans. Slopes range from 2 to 75 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, semiactive, mesic Ultic Hapludalfs



Tape units: metric. Photo: USDA-NRCS

Sano

The Sano series consists of very deep, moderately well drained soils with a fragipan. These soils formed in a silty mantle 40 to 70 inches thick underlain by residuum of limestone, siltstone or old alluvium. They are on nearly level to undulating uplands and in slight depressions. Slopes range from 0 to 6 percent.

TAXONOMIC CLASS: Coarse-silty, siliceous, semiactive, mesic Glossic Fragiudults

Tape units: metric. Photo: USDA-NRCS

Teddy

The Teddy series consists of deep, moderately well drained soils that have a slowly permeable fragipan. These soils formed in a loamy mantle over residuum weathered from limestone, shale, sandstone, and siltstone. They are on nearly level to sloping broad ridgetops and upper side slopes. Slopes range from 0 to 12 percent.

TAXONOMIC CLASS: Fine-loamy, siliceous, semiactive, mesic Typic Fragiudults

Tape units: feet. Photo: USDA-NRCS

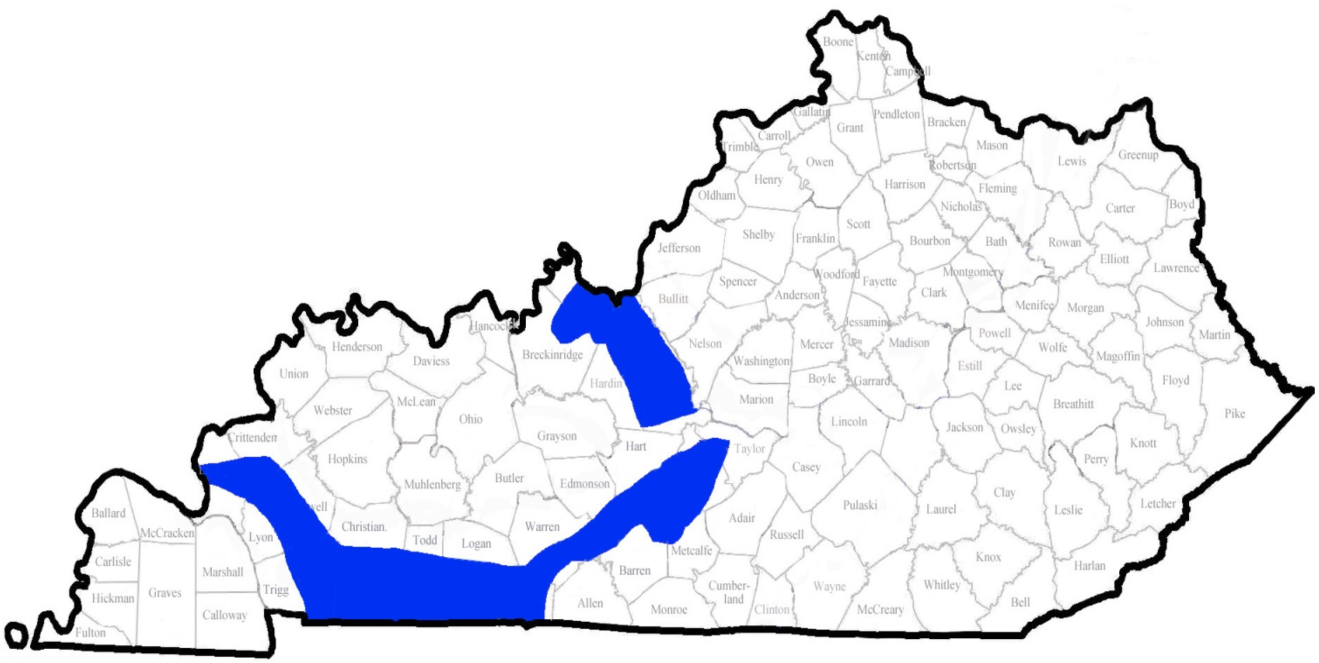
Trimble

The Trimble series consists of deep, well-drained, moderately permeable soils formed in a regolith from cherty limestone that in some areas is interbedded with siltstone or fine grained sandstone. These soils are on narrow ridgetops, sideslopes, and toeslopes. Slopes range from 2 to 45 percent.

TAXONOMIC CLASS: Fine-loamy, siliceous, semiactive, mesic Typic Paleudults

Western Pennyroyal

MLRA 122

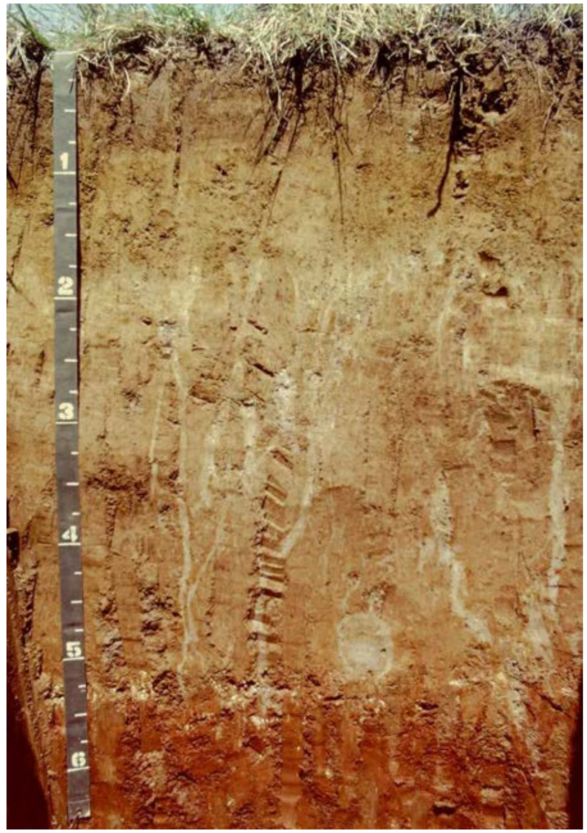


Tape units: feet. Photo: A. D. Karathanasis

Baxter

The Baxter series consists of very deep, well drained soils that formed in fine-textured residuum of cherty limestone. They are on hillsides and ridge tops. Many areas have karst topography. Slopes range from 2 to 60 percent.

TAXONOMIC CLASS: Fine, mixed, semiactive, mesic Typic Paleudalfs

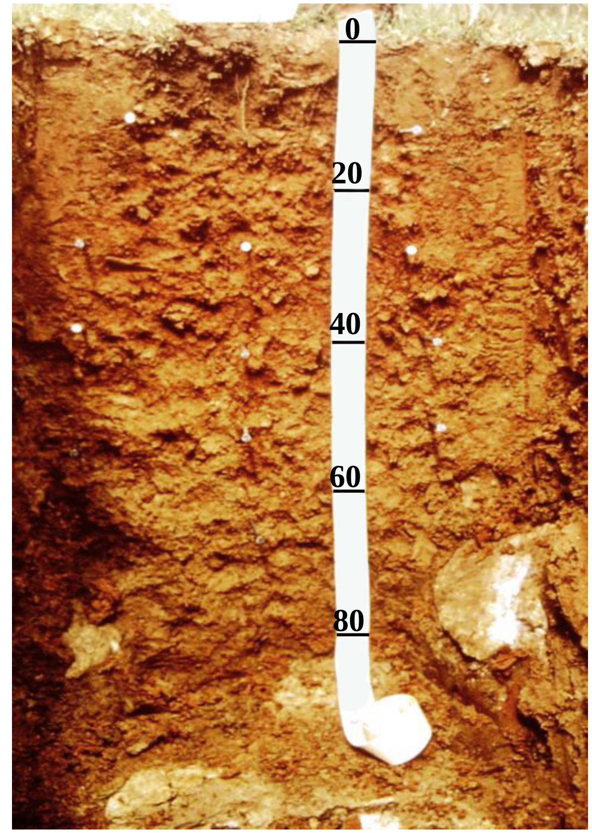


Tape units: feet. Photo: A.D. Karathanasis

Bedford

The Bedford series consists of very deep, moderately well drained soils with a fragipan. These soils formed in loess and the underlying loamy material over a paleosol from clayey residuum. They are on summits, shoulders and to a lesser extent backslopes of hills underlain with limestone bedrock. Slopes range from 0 to 12 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Oxyaquic Fragiudalfs

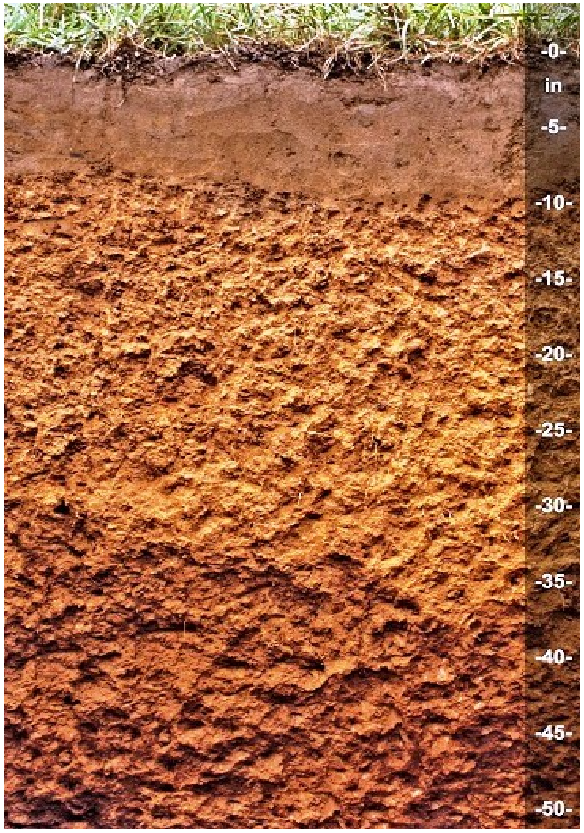


Tape units: metric. Photo: A.D. Karathanasis

Caneyville

The Caneyville series consists of moderately deep, well-drained soils that formed in a thin silty mantle over fine textured residuum of limestone. These soils are on ridgetops and hillsides. Slopes range from 2 to 120 percent.

TAXONOMIC CLASS: Fine, mixed, active, mesic Typic Hapludalfs

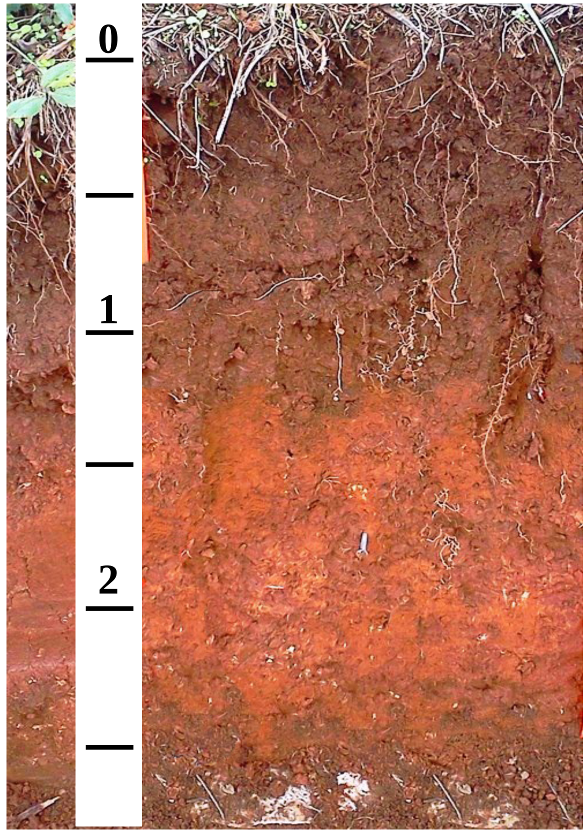


Tape units: inches. Photo: J. Kelly

Crider

The Crider series consists of very deep, well drained, moderately permeable soils that formed in a loess mantle and the underlying residuum from limestone. These soils are on nearly level to moderately steep uplands. Slopes range from 0 to 12 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Typic Paleudalfs



Tape units: feet. Photo: A. D. Karathanasis

Fredonia

The Fredonia series consists of moderately deep, well drained soils that formed in residuum from massive gray limestone. Permeability is moderately slow or slow. These soils are on rolling uplands. Slopes range from 2 to 30 percent.

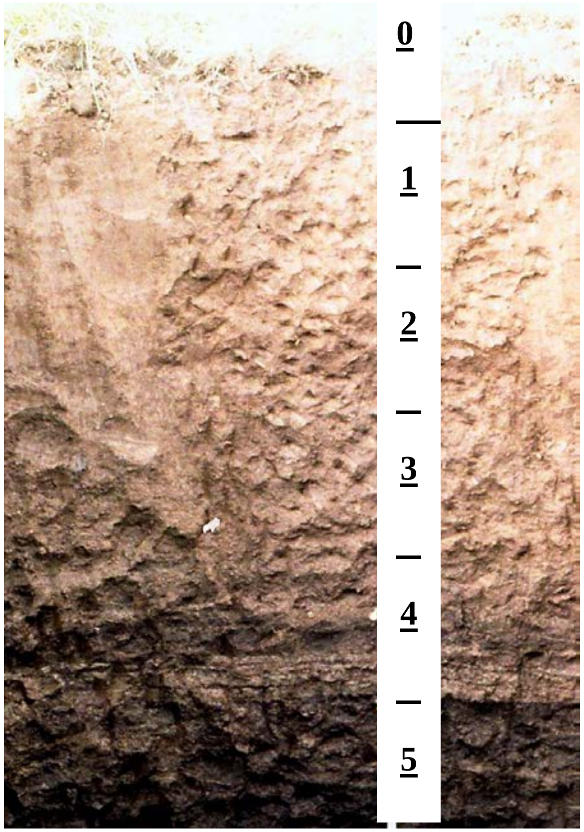
TAXONOMIC CLASS: Fine, mixed, active, mesic Typic Hapludalfs

Tape units: feet. Photo: USDA-NRCS

Hammack

The Hammack series consists of very deep, well drained, moderately permeable soils that formed in a 20 to 40 inch loess mantle underlain by residuum from cherty limestone. These soils are on ridgetops and sideslopes of rolling to hilly areas. Slopes range from 2 to 60 percent.

TAXONOMIC CLASS: Fine-silty, mixed, semiactive, mesic Glossic Paleudalfs

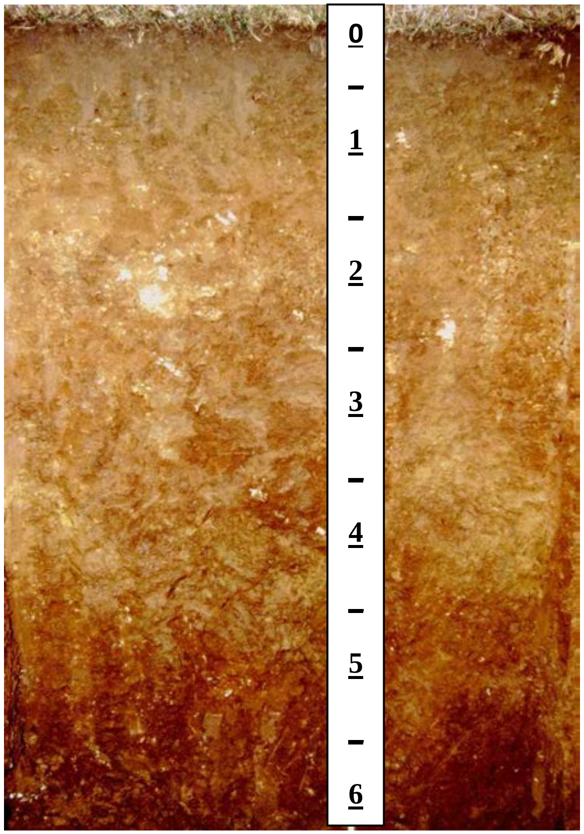


Tape units: feet. Photo: A.D. Karathanasis

Nolin

The Nolin series consists of very deep, well drained soils that formed in alluvium derived from limestone, sandstone, siltstone, shale and loess. These soils are on nearly level flood plains, in concave depressions, or on natural levees of major streams and rivers. Slopes range from 0 to 25 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Dystric Fluventic Eutrudepts

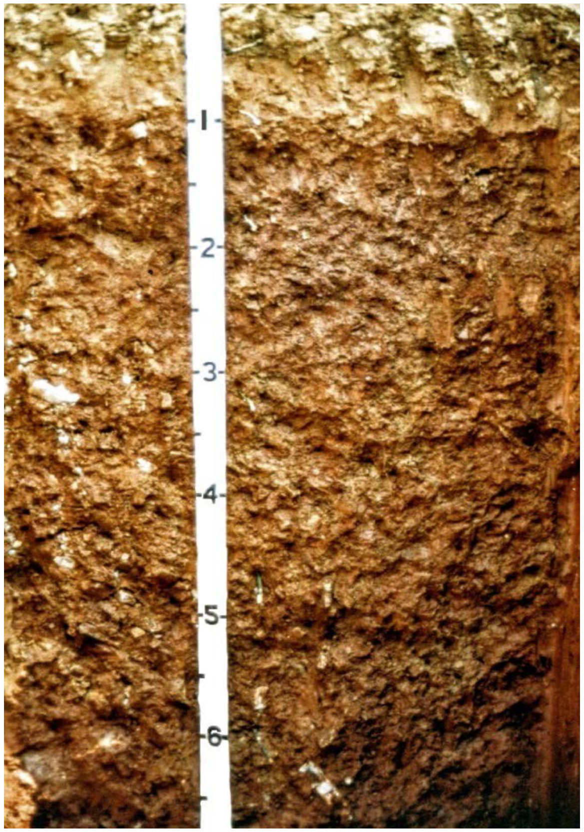


Tape units: feet. Photo: A.D. Karathanasis

Pembroke

The Pembroke series consists of very deep, well drained soils that formed in a thin silty mantle, presumably loess, and in part in the underlying older alluvium or limestone residuum or both. They are on nearly level uplands and karst areas. Slopes range from 0 to 12 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Mollic Paleudalfs



Tape units: feet. Photo: A.D. Karathanasis

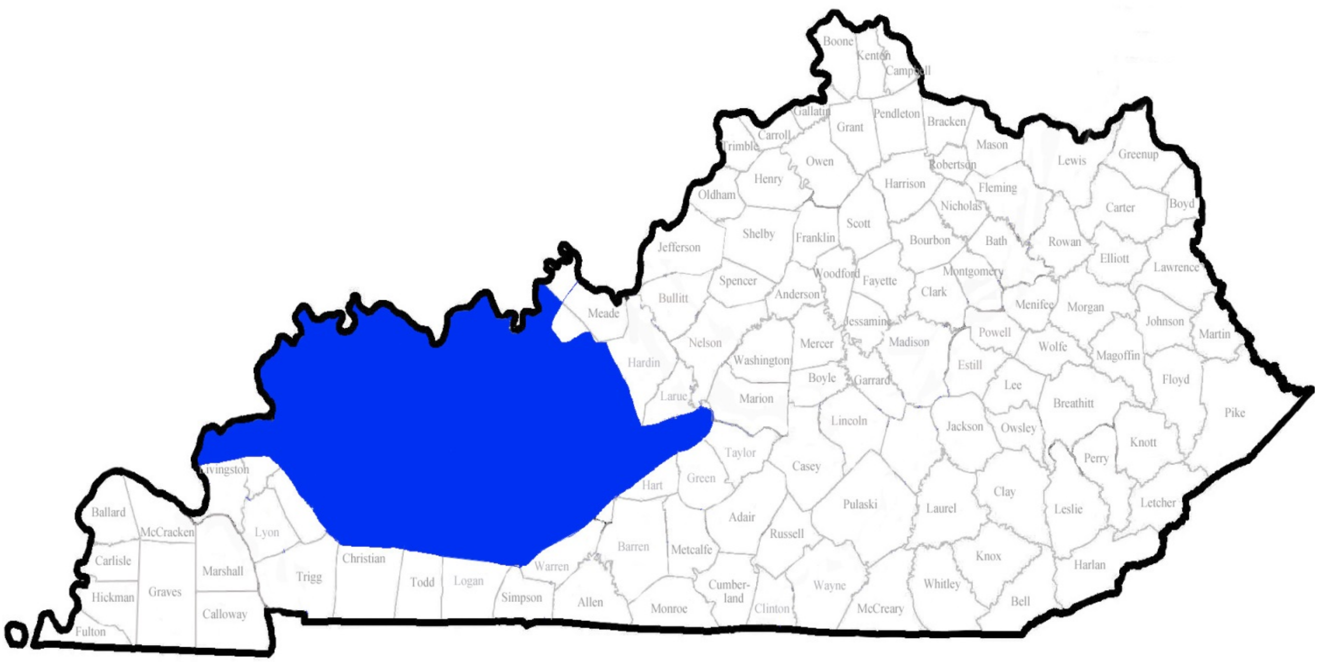
Vertrees

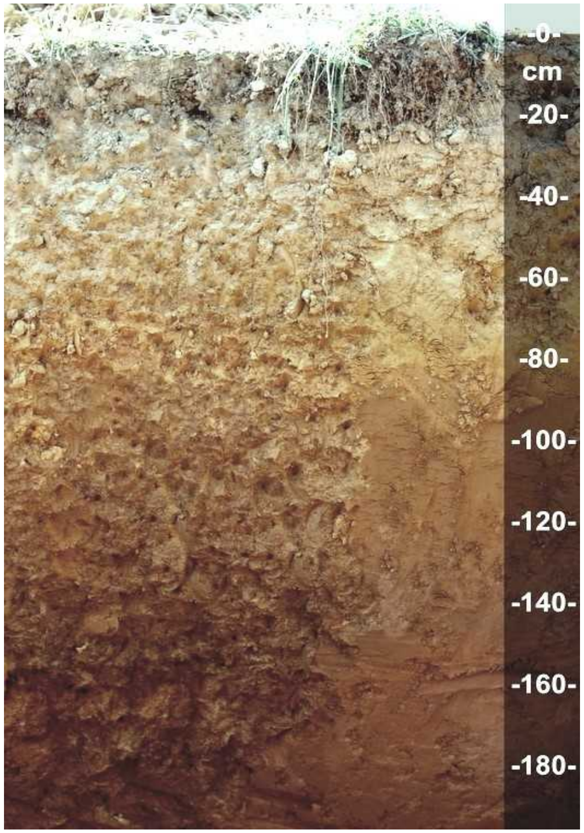
The Vertrees series consists of very deep, well drained soils that formed in residuum from limestone interbedded with siltstone and shale. These gently sloping to steep soils are on ridges and side slopes with most in karst areas. Slopes range from 2 to 30 percent.

TAXONOMIC CLASS: Fine, mixed, semiactive, mesic Typic Paleudalfs

Western Coal Fields

MLRA 120A



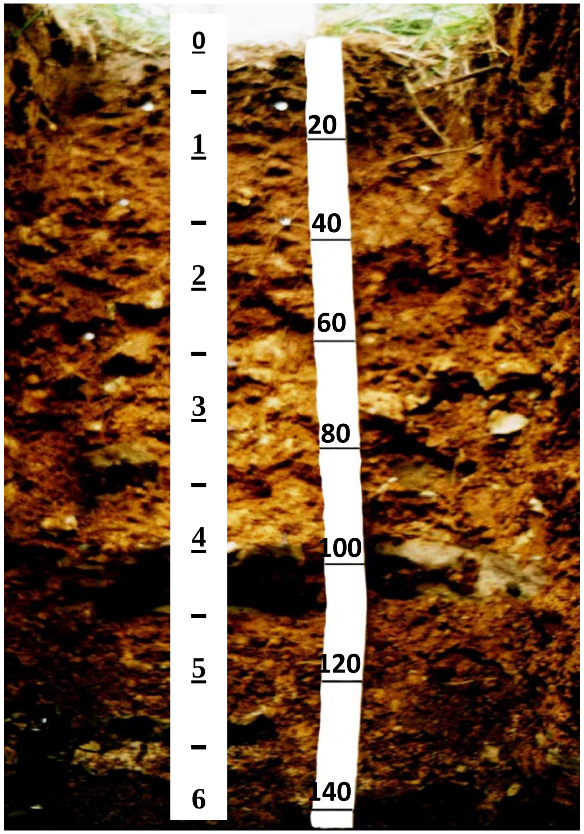


Tape units: metric. Photo: J. Kelley

Alford

The Alford series consists of very deep, well drained soils that formed in loess. These soils are commonly on summits, shoulders and backslopes of loess hills, and less commonly on broad swells of outwash plains. Slopes range from 0 to 60 percent.

TAXONOMIC CLASS: Fine-silty, mixed, superactive, mesic Ultic Hapludalfs



Tape units: metric. Photo: A.D. Karathanasis

Frondorf

The Frondorf series consists of moderately deep, well drained soils that formed in a mantle of loess over residuum from acid sandstone, siltstone and shale. These soils are on hillsides and narrow ridgetops. Slopes range from 6 to 60 percent.

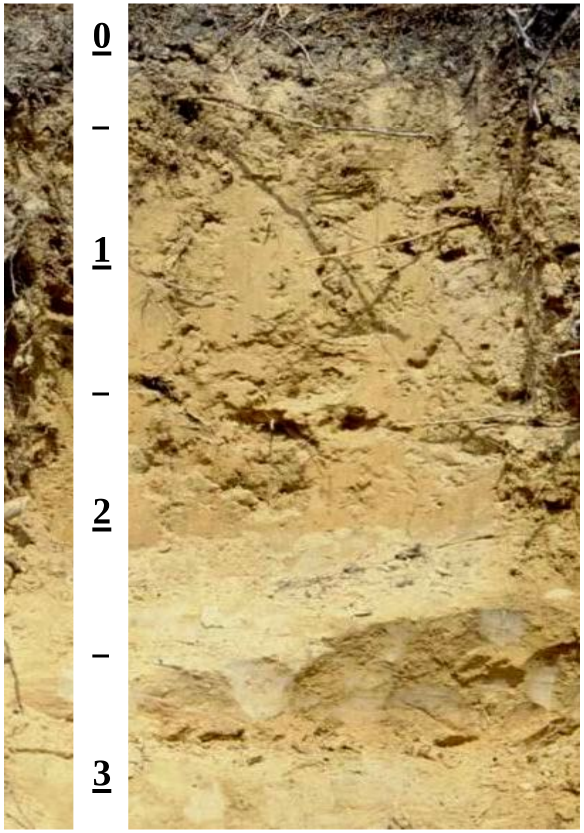
TAXONOMIC CLASS: Fine-loamy, mixed, active, mesic Ultic Hapludalfs

Tape units: metric. Photo: M. McCauley

Hosmer

The Hosmer series consists of very deep, moderately well drained soils with a fragipan that formed in loess. These soils are on summits, shoulders, and backslopes of loess hills. Slopes range from 0 to 30 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Oxyaquic Fragiudalfs



Tape units: feet. Photo: A.D. Karathanasis

Lenberg

The Lenberg series consists of moderately deep, well drained soils that formed in residuum of acid clayey shale. Permeability is moderately slow. These soils are on sloping to steep hillsides. Slopes range from 6 to 45 percent.

TAXONOMIC CLASS: Fine, mixed, semiactive, mesic Ultic Hapludalfs

Tape units: feet. Photo: USDA- NRCS

McGary

The McGary series consists of very deep, somewhat poorly drained soils that formed in loess underlain by calcareous, fine-textured lacustrine deposits. These soils are on lake plains and less commonly on flood-plain steps. Slopes range from 0 to 10 percent.

TAXONOMIC CLASS: Fine, mixed, active, mesic Aeric Epiaqualfs

Tape units: feet. Photo: A.D. Karathanasis

Riney

The Riney series consists of deep and very deep, well drained soils that formed on uplands or remnant high terraces from weakly consolidated sandstone and shale, or in slumped sinkhole deposits left behind after karst erosion. Slopes range from 6 to 30 percent.

TAXONOMIC CLASS: Fine-loamy, siliceous, semiactive, mesic Typic Hapludults

Tape units: feet. Photo: A.D. Karathanasis

Sadler

The Sadler series consists of deep or very deep, moderately well drained soils with a fragipan. These soils formed in 12 to 48 inches of loess underlain by residuum of acid sandstone, siltstone, and shale. They are on level to rolling upland ridgetops. Slopes range from 0 to 12 percent.

TAXONOMIC CLASS: Fine-silty, mixed, semiactive, mesic Oxyaquic Fraglossudalfs

Tape units: feet. Photo: USDA-NRCS

Sciotoville

The Sciotoville series consists of very deep, moderately well drained soils with a fragipan that formed in silty old alluvium and minor amounts of loamy alluvium derived from shale and sandstone. They are on stream terraces, mainly along the Ohio River and its upper tributaries. Slopes range from 0 to 25 percent.

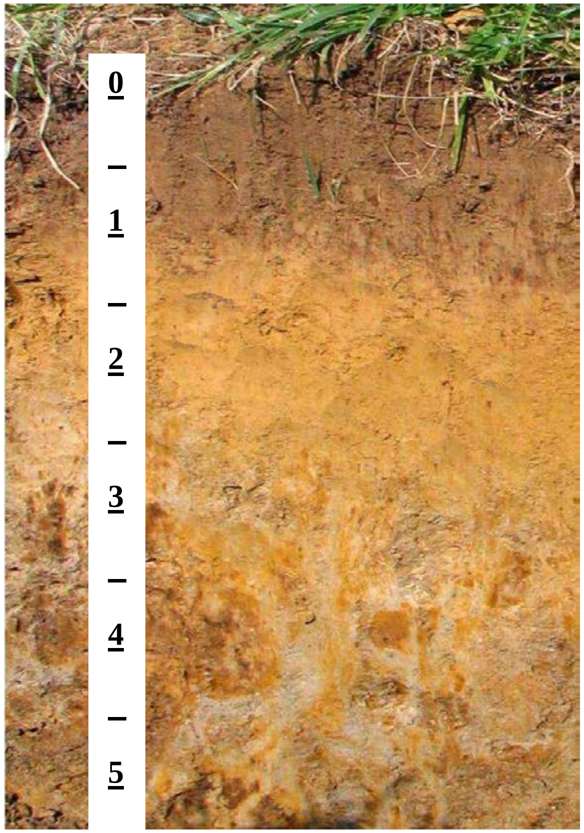
TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Aquic Fragiudalfs

Tape units: inches. Photo: J. McIntosh

Sharon

The Sharon series consists of deep, moderately well drained soils that formed in acid silty alluvium on flood plains. These soils are on nearly level to gently undulating flood plains. Slopes range from 0 to 4 percent.

TAXONOMIC CLASS: Coarse-silty, mixed, active, mesic Oxyaquic Dystrudepts



Tape units: feet.   Photo: A. D. Karathanasis

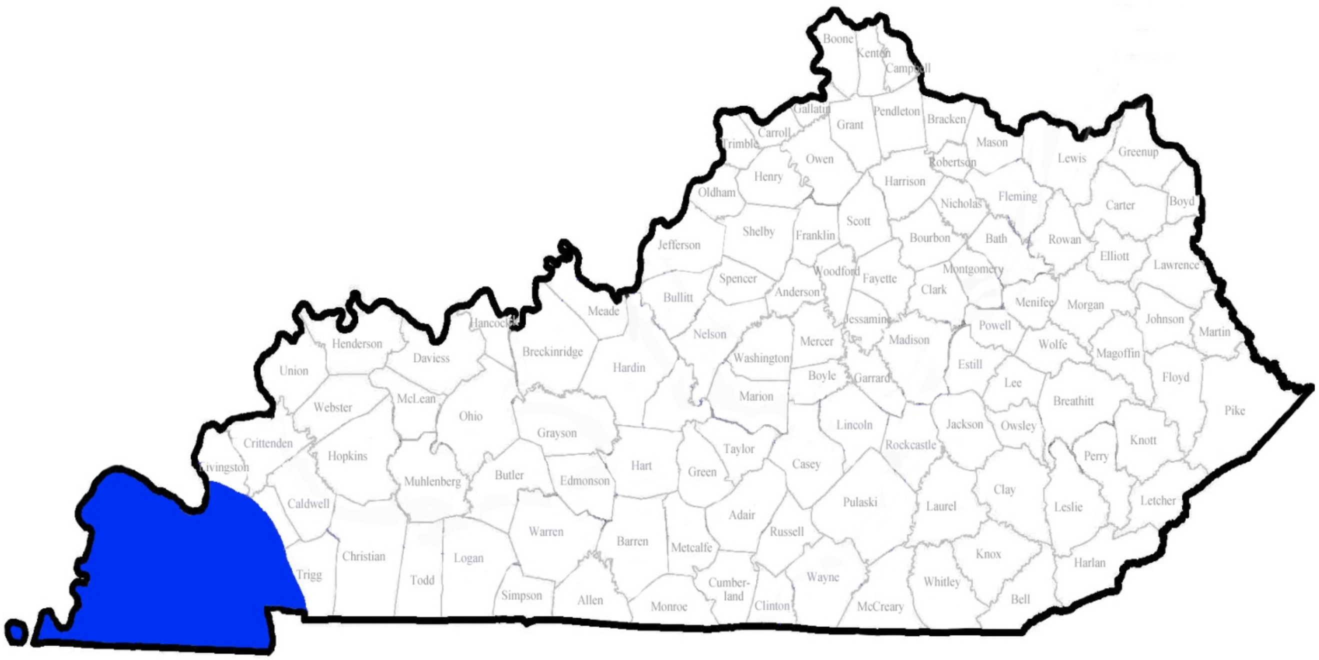
Zanesville

The Zanesville series consists of deep and very deep, moderately well drained soils with a fragipan. They formed in loess over residuum derived from sandstone, siltstone, and shale. These soils are on upland summits, shoulders and backslopes. Slopes range from 0 to 30 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, mesic Oxyaquic Fragiudalfs

Purchase

MLRA 131A and 134

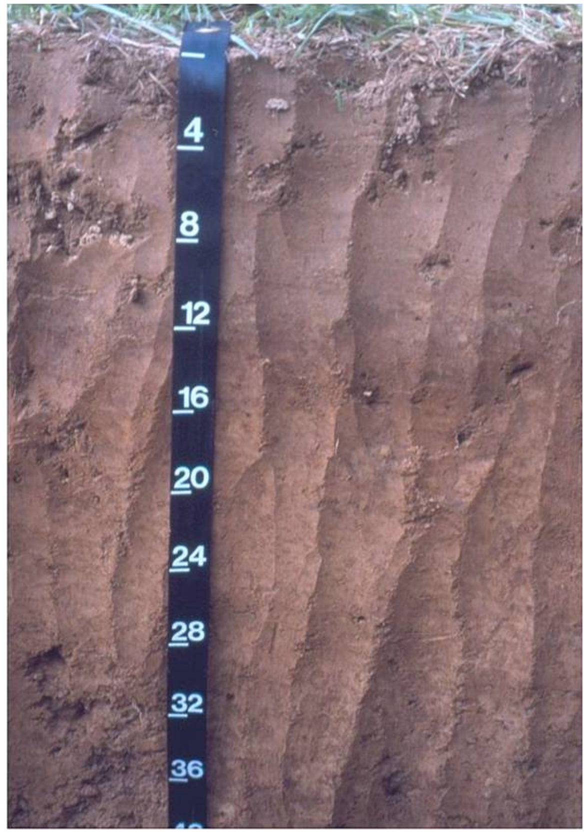


Tape units: feet. Photo: USDA- NRCS

Brandon

The Brandon series consists of very deep, well drained soils that formed in a silty mantle, presumably loess, over very gravelly or gravelly marine and riverine deposited materials. They are on gently sloping to steep upland ridges and hillsides. Slopes range from 2 to 50 percent.

TAXONOMIC CLASS: Fine-silty, mixed, semiactive, thermic Typic Hapludults



Tape units: inches. Photo: USDA- NRCS

Collins

The Collins series consists of very deep, moderately well drained, moderately permeable soils that formed in silty alluvium derived from loess. These are nearly level soils on flood plains and in drainageways. Slopes range from 0 to 2 percent.

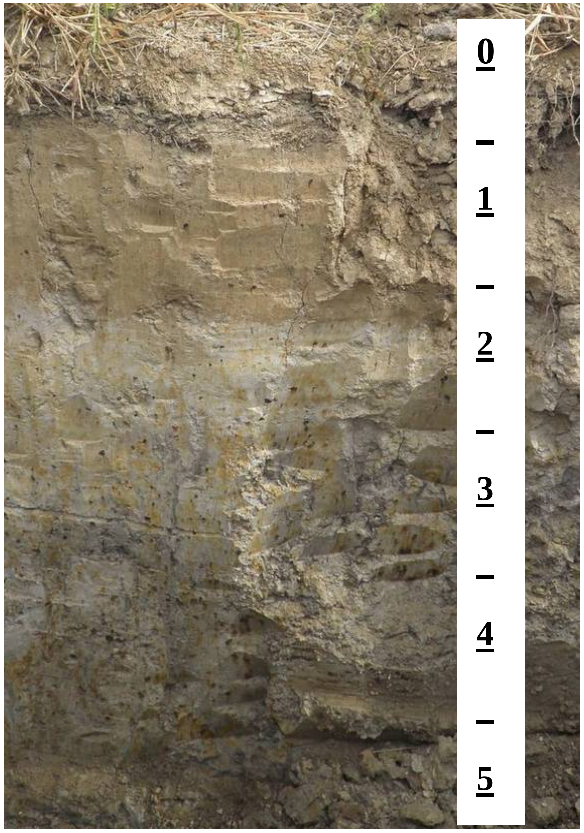
TAXONOMIC CLASS: Coarse-silty, mixed, active, acid, thermic Aquic Udifluvents

Tape units: inches. Photo: USDA- NRCS

Dekoven

The Dekoven series consists of very deep, very poorly drained, moderately permeable soils that formed in alluvial material derived from loess. They are in depressional areas on flood plains adjacent to the thick loess uplands. Slopes range from 0 to 3 percent.

TAXONOMIC CLASS: Fine-silty, mixed, superactive, thermic Typic Endoaquolls

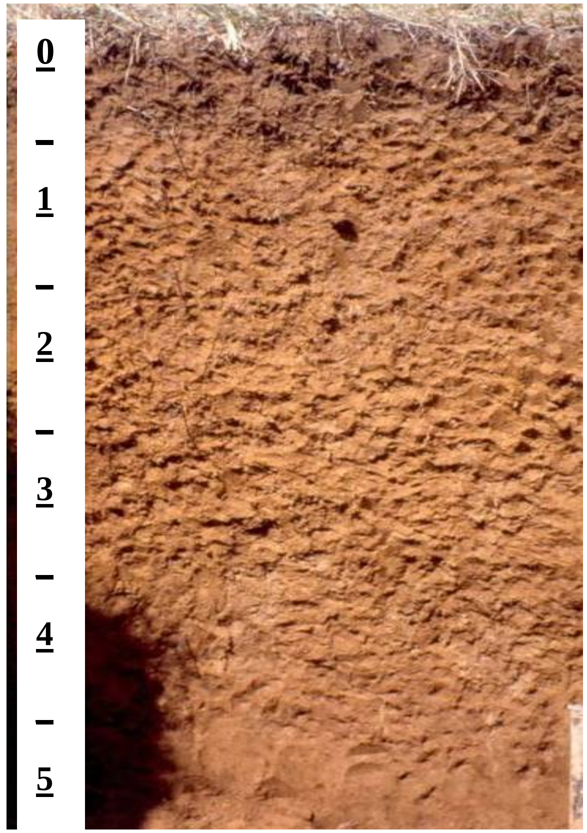


Tape units: feet. Photo: J. McIntosh

Falaya

The Falaya series consists of very deep, somewhat poorly drained, moderately permeable soils that formed in silty alluvium derived from loess. These soils are on level to nearly level, rather wide flood plains. Slopes range from 0 to 2 percent.

TAXONOMIC CLASS: Coarse-silty, mixed, active, acid, thermic Aeric Fluvaquents

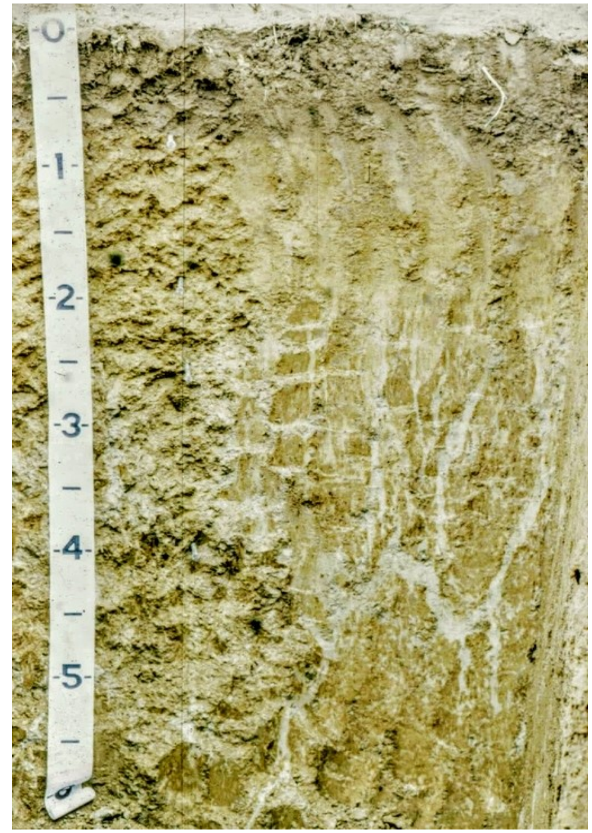


Tape units: feet. Photo: J. McIntosh

Felicicana

The Feliciana series consists of very deep, well drained, moderately permeable soils that formed in Peoria loess deposits more than 48 inches in thickness. These soils are on nearly level to very steep uplands and terraces. Slopes range from 0 to 40 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, thermic Ultic Hapludalfs



Tape units: feet. Photo: A.D. Karathanasis

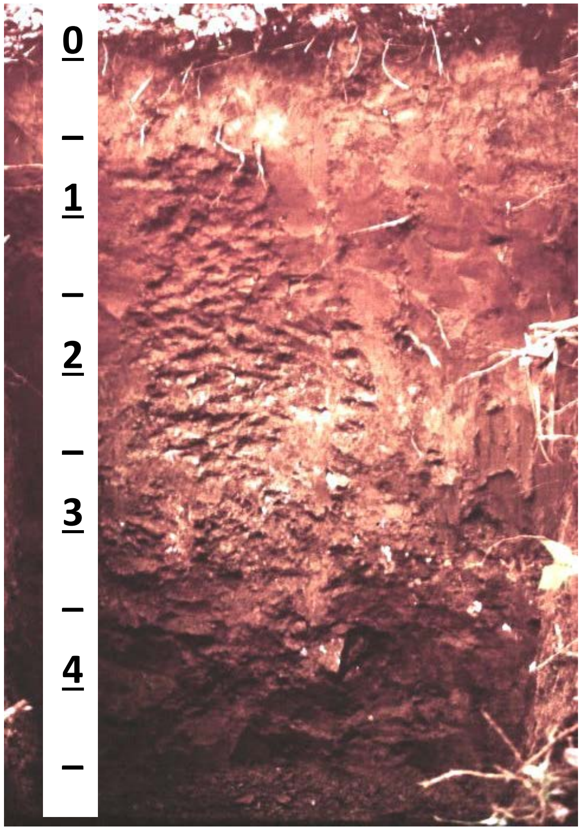
Grenada

The Grenada series consists of very deep, moderately well drained soils with a fragipan that formed in thick silty loess. These nearly level to sloping soils are on uplands and stream terraces of low relief. Slopes range from 0 to 12 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, thermic Oxyaquic Fraglossudalfs

Tape units: feet. Photo: USDA- NRCS

Tape units: metric. Photo: USDA- NRCS



Tape units: feet. Photo: USDA-NRCS

Keyespoint

The Keyespoint series consists of very deep, somewhat poorly drained, very slowly permeable soils that formed in recent clayey alluvium and loamy alluvium These soils are on broad, level to undulating, braided flood plains of the lower Mississippi River. Slopes range from 0 to 5 percent.

TAXONOMIC CLASS: Clayey over loamy, smectitic over mixed, superactive, nonacid, thermic Vertic Epiaquepts

Kurk

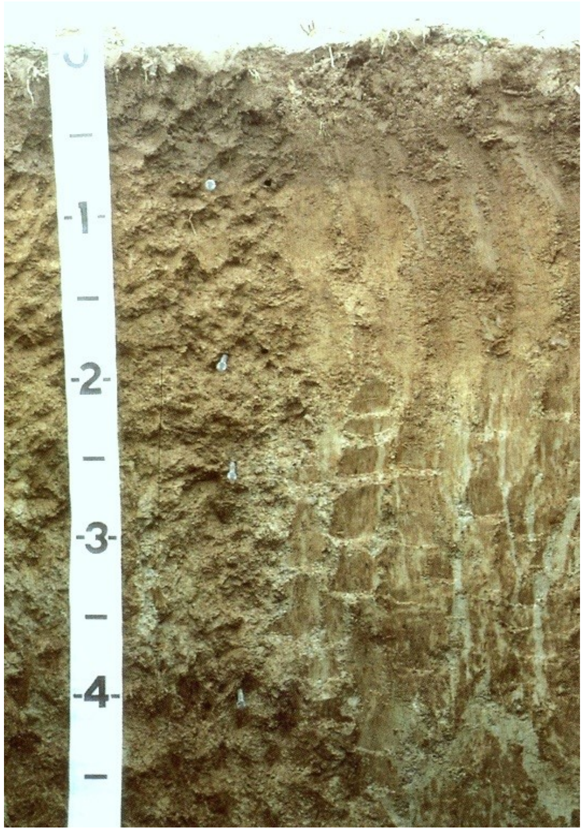
The Kurk series consists of very deep, somewhat poorly drained soils that formed in 2 to 5 feet of silty alluvium over loess. They are on nearly level to gently sloping stream terraces and slightly concave upland depressions near drainageways. Slopes range from 0 to 3 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, thermic Aeric Epiaqualfs

Lax

The Lax series consists of very deep, moderately well drained soils with a dense fragipan. These soils formed in a silty mantle 2 to 3 feet thick underlain by Coastal Plain and riverine gravelly alluvium and limestone residuum. They are on nearly level to rolling uplands. Slopes range from 2 to 20 percent.

TAXONOMIC CLASS: Fine-silty, mixed, semiactive, thermic Typic Fragiudults

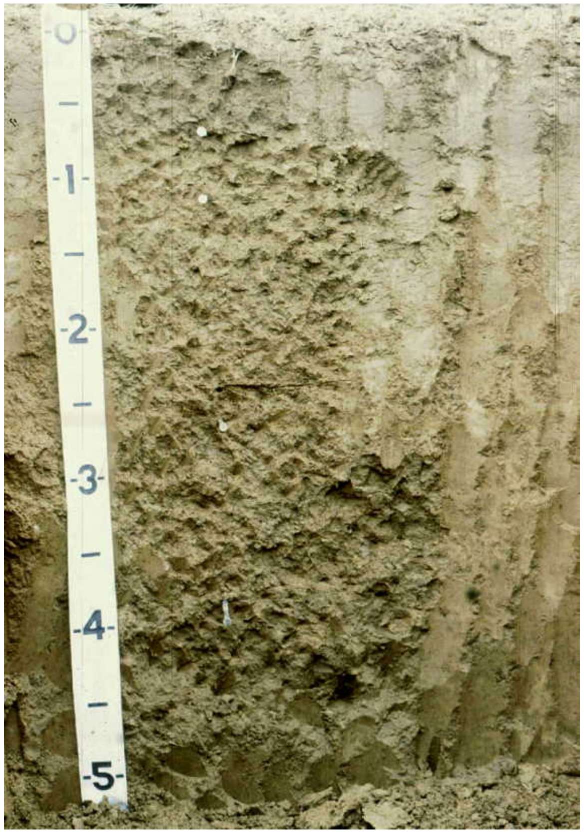


Tape units: feet. Photo: USDA- NRCS

Loring

The Loring series consists of moderately well drained soils with a fragipan. These soils formed in loess which is more than 4 feet thick. They are on level to strongly sloping uplands and stream terraces. Slopes range from 0 to 20 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, thermic Oxyaquic Fragiudalfs



Tape units: feet. Photo: A.D. Karathanasis

Memphis

The Memphis series consists of very deep, well drained, moderately permeable soils that formed in loess deposits more than 48 inches in thickness. These soils are on nearly level to very steep uplands and terraces of the Coastal Plain. Slopes range from 0 to 50 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, thermic Typic Hapludalfs

Tape units: feet. Photo: USDA- NRCS

Openlake

The Openlake series consists of very deep, somewhat poorly drained, very slowly permeable soils that formed in thick deposits of recent clayey alluvium. These soils are on broad, level to undulating flood plains of the Mississippi River. Slopes range from 0 to 5 percent.

TAXONOMIC CLASS: Fine, smectitic, nonacid, thermic Vertic Epiaquepts

Tape units: feet. Photo: USDA- NRCS

Purchase

The Purchase series consists of very deep, moderately well to well drained, slowly permeable soils with a fragipan. They formed in more than 5 feet of loess. These soils are on gently sloping to moderately steep actively degrading side slopes. Slopes range from 4 to 20 percent.

TAXONOMIC CLASS: Coarse-silty, mixed, active, thermic Oxyaquic Fragiudalfs

Tape units: inches. Photo: USDA- NRCS

Routon

The Routon series consists of very deep, poorly drained, slowly permeable soils that formed in silty alluvium derived from loess that is greater than 4 feet in thickness. These soils are on nearly level stream terraces and in slight upland depressions. Slopes range from 0 to 3 percent.

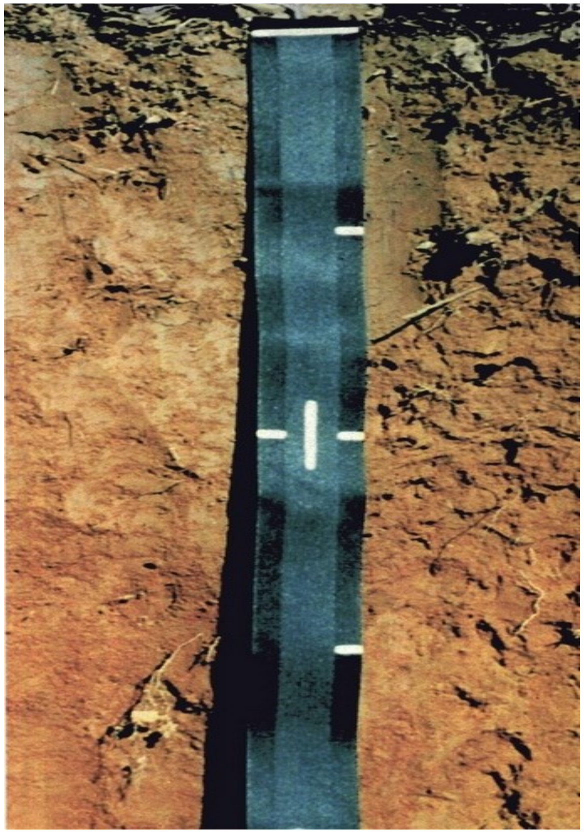
TAXONOMIC CLASS: Fine-silty, mixed, active, thermic Typic Epiaqualfs

Tape units: feet. Photo: USDA- NRCS

Saffell

The Saffell series consists of very deep, well drained, moderately permeable soils that formed in loamy and gravelly marine sediments. These soils are on nearly level to gently sloping ridgetops and moderately sloping to very steep sideslopes. Slopes range from 1 to 60 percent.

TAXONOMIC CLASS: Loamy-skeletal, siliceous, semiactive, thermic Typic Hapludults



Tape units: feet.   Photo: USDA- NRCS

Smithdale

The Smithdale series consists of very deep, well drained, moderately permeable soils that formed in thick beds of loamy marine or fluvial deposits. These soils are on ridge tops and hill slopes in dissected uplands. Slopes range from 1 to 60 percent.

TAXONOMIC CLASS: Fine-loamy, siliceous, subactive, thermic Typic Hapludults

SELECTED SOIL PROFILE DESCRIPTIONS AND CHARACTERIZATION DATA

List of Profiles

Alford
Baxter
Bedford
Belknap
Bluegrass
Caneyville
Crider
Eden
Fairpoint
Faywood
Feliciana
Frederick
Frondorf
Garmon
Gilpin
Grenada
Hosmer
Huntington
Latham
Lenberg
Loring
Lowell
Marrowbone
McAfee
Memphis
Muse
Nicholson
Nolin
Pembroke
Shelocta
Trappist
Wilbur
Zanesville

Pedon ID: 06KY-101-03
Soil Name As Correlated: Alford, silt loam
Classification: Fine-silty, mixed, superactive, mesic Ultic Hapludalfs

Description Date: 04/18/2006 **Describers:** Eddie Tudor, Scott Aldridge
Location Description: Henderson Co, KY; Hwy 145 and Dixie Lane across from Powell Brothers Family house on ridge.
Lat: 37º 39’ 32.00” N; Long: 87º 40’ 18.00” W

Landscape Position: on summit of summit interfluve on upland
Slope: 23 percent
Drainage: Well drained
Primary Earth Cover: Tree cover
Parent Materials: Thick fine-silty loess

Ap – 0 - 23 cm; brown (10YR 4/3) silt loam; weak fine granular structure; friable; few fine roots throughout; abrupt wavy boundary.

Bt$_1$ – 23 - 43 cm; dark yellowish brown (10YR 4/6) silt loam; moderate medium subangular blocky structure; friable; few fine roots throughout; 30 percent continuous distinct yellowish brown (10YR 5/6), moist, clay films; abrupt wavy boundary.

Bt$_2$ – 43 - 97 cm; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few fine roots throughout; 30 percent continuous distinct dark yellowish brown (10YR 4/6), moist, clay films on all faces of peds; clear smooth boundary.

Bt$_3$ – 97 -130 cm; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few fine roots throughout; 30 percent continuous prominent yellowish brown (10YR 5/6), moist, clay films on all faces of peds; 5 percent fine faint dark brown (10YR 3/3), moist, manganese masses; abrupt wavy boundary.

Bt$_4$ – 130-185 cm; strong brown (7.5YR 5/8) silt loam; strong medium subangular blocky structure; friable; few fine roots throughout; 30 percent continuous distinct yellowish brown (10YR 5/6), moist, clay films on all faces of peds; gradual wavy boundary.

Bt$_5$ – 185-240 cm; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable, few very fine roots throughout; 15 percent continuous distinct dark yellowish brown (10YR 4/4), moist, clay films on all faces of peds.

Alford silt loam; 06KY-101-03

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-23	**Ap**	0.1	0.2	0.7	0.9	1.9	3.8	83.5	12.7	SIL/SI
23-43	**Bt_1**	0.0	0.1	0.2	0.4	1.4	2.1	80.3	17.6	SIL
43-97	**Bt_2**	0.1	0.1	0.1	0.1	1.6	2.0	72.7	25.3	SIL
97-130	**Bt_3**	0.0	0.1	0.1	0.2	1.9	2.3	77.0	20.7	SIL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Bt_4	3.9		1.7	3.3	0.2	0.1	5.3	10.1	8.1	52			

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 87KY-163-02
Soil Name As Correlated: Baxter, gravelly silt loam
Classification: Fine, mixed, semiactive, mesic Typic Paleudalfs

Description Date: 05/12/1987 **Describers:**
Location Description Meade County, KY; 500 feet south of a gravel road, 3000 feet west of Ft. Knox, about 2 miles south of Lickskillet. Rock Haven Topographic Quadrangle
Lat: 37° 54’ 54” N Long: 86° 03’ 51” W

Landscape Position: Upland, middle 1/3 of convex sideslope of karst sinkhole
Slope: 14 percent
Drainage:
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Weeds and grasses (Conservation Reserve Program field)
Parent Materials: Thin loess over reworked pedisediment over residuum

Ap—0-15 cm; brown (7.5YR 4/4) gravelly silt loam; weak fine subangular blocky parting to moderate medium granular structure; friable; common fine and medium roots; 13% by volume angular and rounded gravel, 19-76 mm; mildly alkaline; abrupt smooth boundary.

Bt_1 – 15-30 cm; yellowish red (5YR 5/6) gravelly silty clay; moderate medium subangular blocky structure; firm; few fine roots; many thin clay films on faces of peds; 19% by volume angular and rounded gravel, 19-76 mm; strongly acid; gradual wavy boundary.

Bt_2 –30-66 cm; red (2.5YR 4/6) gravelly clay; common medium prominent strong brown (7.5YR 5/6) mottles; moderate fine and medium angular and subangular blocky structure; very firm; few fine roots; continuous thin clay films on faces of peds; 14% by volume angular and rounded gravel, 19-76 mm; very strongly acid; gradual wavy boundary.

Bt_3 – 66-99 cm; dark red (2.5YR 3/6) clay; many medium prominent (5YR 5/6) mottles (30%); strong fine and medium angular blocky structure; very firm; few fine roots; 10% by volume angular and rounded gravel 2-76 mm; continuous thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt_4 – 99-145 cm; dark red (2.5YR 3/6) clay; many medium prominent strong brown (7.5YR 5/6) mottles (40%); strong fine and medium angular blocky structure; very firm; 10% by volume angular and rounded gravel 2-76 mm; continuous thin clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt_5 – 145-193 cm; mottled dark red (2.5YR 3/6) and light yellowish brown (10YR 6/4) clay; strong fine and medium angular blocky structure; very firm; 10% by volume angular and rounded gravel 2-76 mm; continuous thin clay films on faces of peds; few slickensides up to 7 cm across; very strongly acid; gradual wavy boundary.

Bt_6 – 193-230 cm; red (2.5YR 4/6) clay; common medium prominent yellowish brown (10YR 5/4) mottles; strong medium angular blocky structure; very firm; 10% by volume angular and rounded gravel 2-76 mm; continuous thin clay films; common slickensides up to 12 cm across; very strongly acid.

Baxter gravelly silt loam; 87KY-163-02

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-15	**Ap**	2.7	1.4	1.8	4.8	3.1	13.8	66.4	19.8	SIL
15-30	**Bt_1**	0.5	0.6	1.0	4.3	2.9	9.3	56.1	34.6	SICL
30-66	**Bt_2**	0.2	0.2	0.4	2.0	1.6	4.4	35.2	60.4	C
66-99	**Bt_3**	0.2	0.2	0.2	1.3	1.5	3.4	26.6	70.0	C
99-145	**Bt_4**	0.2	0.2	0.3	1.6	1.3	3.6	26.8	69.6	C
145-193	**Bt_5**	0.3	0.2	0.2	1.2	1.3	3.2	33.7	63.1	C
193-230	**Bt_6**	0.1	0.1	0.1	0.5	0.6	1.4	20.1	78.5	C

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	6.2		7.8	1.2	0.2	0.1	9.3	12.6	3.0	74	0.2	1.0	56
Bt_1	5.5		4.5	1.4	0.1	0.1	6.1	14.0	8.0	44	0.1	0.7	2
Bt_2	5.2		4.0	3.7	0.2	0.1	8.0	22.5	17.7	36	0.1	0.6	2
Bt_3	5.2		3.8	3.7	0.2	0.1	7.8	24.2	17.3	32	0.1	0.5	2
Bt_4	5.2		3.9	4.5	0.2	0.1	8.7	24.1	15.9	36	0.1	0.5	2
Bt_5	5.1		3.9	4.3	0.2	0.1	8.5	21.8	15.5	39	0.1	0.3	2
Bt_6	5.2		6.4	4.8	0.2	0.1	11.5	26.3	16.3	44	0.1	0.3	2

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Clay Mineralogy

Horizon	Clay Mineral Content (%)					
	Hydroxyinterlayered Vermiculite	Interstratified	Kaolinite	Mica	Quartz	Goethite
Bt_1	27	14	34	12	3	10
Bt_2	30	13	38	9	1	9

Pedon ID: 79KY-213-05
Soil Name As Correlated: Bedford, silt loam
Classification: Fine-silty, mixed, active, mesic Oxyaquic Fragiudalfs

Description Date: 06/12/1979 **Describer:** John H. Newton
Location Description: Simpson Co, KY; 2.75 miles west of Ky Hwy 73, about 1 mile north of Franklin; Kentucky Coordinate Grid System: X- 1,741,500; Y – 152,000.

Landscape Position: Depression in broad upland plain
Slope: 1 percent
Drainage:
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Fescue pasture
Parent Materials: Colluvium or loess over limestone residuum

Ap – 0-18 cm; grayish brown (10YR 5/2) silt loam; common medium distinct brown mottles; weak fine and medium granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

Bt – 18-48 cm; yellowish brown (10 5/4) silt loam; common medium distinct grayish brown mottles, weak medium subangular blocky structure; friable; common fine roots; few fine pores; few thin discontinuous clay films; extremely acid; clear wavy boundary.

Btx_1 – 48-91 cm; mottled dark yellowish brown (10YR 4/4), brown (7.5YR 4/4), and grayish brown (10YR 5/2) silt loam; moderate very coarse prismatic parting to moderate fine angular blocky structure; very firm, brittle; silt coating between prism 0.2 - 8 cm thick; many discontinuous clay films on small peds; extremely acid; gradual smooth boundary.

Btx_2 – 91-127 cm; strong brown (7.5YR 5/6) silt loam; common medium distinct light brownish gray mottles; moderate very coarse prismatic structure parting to weak medium angular blocky; very firm, brittle; few fine roots between prisms; few fine pores in prisms; light brownish gray silt coatings between prisms 0.2 - 5 cm thick; many discontinuous clay films on small peds; extremely acid; gradual smooth boundary.

Btx_3– 127-152 cm; same as above except common black coatings, stains, and nodules.

2Bt – 152-183 cm; mottled, red (2.5YR 4/6), yellowish brown (10YR 5/6), and gray (10YR 6/1) silty clay; moderate fine and medium angular blocky structure; firm; many discontinuous clay films; few small black concretions and nodules; very strongly acid.

Bedford silt loam; 79KY-213-05

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-18	**Ap**	0.2	0.3	0.6	7.0	3.8	11.9	74.6	13.5	SIL/SI
18-48	**Bt**	0.1	0.2	0.4	4.3	2.5	7.5	65.7	26.8	SIL/SICL
48-91	**Btx_1**	0.1	0.3	0.7	8.3	4.9	14.3	67.3	18.4	SIL
91-127	**Btx_2**	0.4	0.8	1.3	13.3	7.4	23.2	58.3	18.5	SIL
127-152	**Btx_3**	0.4	1.1	1.9	16.4	8.5	28.3	45.7	26.0	SIL
152-183	**2Bt**	0.4	1.0	1.7	14.3	7.5	24.9	30.9	44.2	SIC

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	5.5	5.1	5.7	0.3	0.1	0.4	6.5	7.4	5.7	88	0.1	2.1	6
Bt	4.9	3.7	3.8	1.1	0.2	0.5	5.6	12.0	12.2	47	0.1	0.8	1
Btx_1	5.0	3.7	1.2	0.9	0.1	0.4	2.6	7.8	10.0	33	0.1	0.3	1.5
Btx_2	5.0	3.5	1.4	0.9	0.1	0.4	2.8	7.4	9.6	38	0.1	0.2	1
Btx_3	5.1	3.7	1.4	1.2	0.1	0.5	3.2	8.5	10.0	38	0.1	0.1	1
2Bt	5.0	3.6	1.9	1.8	0.1	0.5	4.3	12.2	12.5	35	0.2	0.2	0.5

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Mineralogy

Horizon	Sand and Silt Mineral Content (%)					Clay Mineral Content (%)				
	Q	F	K	CL	INT	V	HIV	K	MI	Q
Btx_1	89	4	1	3	3	21	25	31	19	4
2Bt	99				1	11	11	57	19	2

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; I = illite; F = feldspars.

Pedon ID: 07KY-033-01
Soil Name As Correlated: Belknap, silt loam
Classification: Coarse-silty, mixed, active, mesic Fluvaquentic, Dystrudepts

Description Date: 07/16/2007 **Describer:** KES
Location Description: Caldwell County, KY; Tradewater River near Towery bridge, Dalton 7.5' USGS quad.
Lat: 37.314 N Long: 87.846 W

Landscape Position: Floodplain
Slope: 0-2 percent
Drainage: Somewhat poorly drained
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Grass, fallow
Parent Materials: Alluvium

Ap – 0-18 cm; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; very friable; strongly acid (pH 5.5); abrupt smooth boundary.

Bw – 18-56 cm; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; very friable; common medium faint brown (10YR 5/3), moist, and common fine distinct light brownish gray (10YR 6/2), moist, iron depletions with clear boundaries in matrix, and common medium distinct strong brown (7.5YR 4/6), moist, masses of oxidized iron with clear boundaries in matrix, and few fine prominent black (10YR 2/1), moist, iron and manganese masses with sharp boundaries in matrix; strongly acid (pH 5.5); clear smooth boundary.

Bg_1 – 56-100 cm; light brownish gray (10YR 6/2) silt loam; weak medium subangular blocky structure; very friable; few fine prominent black (10YR 2/1), moist, iron and manganese masses with sharp boundaries in matrix, and common medium prominent strong brown (7.5YR 5/6), moist, and common medium faint brown (10YR 5/3) masses of oxidized iron with clear boundaries in matrix; strongly acid (pH 5.5); clear smooth boundary.

Bg_2 – 100-150 cm; light brownish gray (10YR 6/2) silt loam; medium subangular blocky structure; very friable; common coarse prominent black (10YR 2/1), moist, iron and manganese masses with sharp boundaries in matrix, and common medium faint brown (10YR 5/3), moist, and common medium prominent yellowish brown (10YR 5/6), moist, masses of oxidized iron with clear boundaries in matrix; strongly acid (pH 5.5); clear smooth boundary.

Cg – 150-220 cm; light brownish gray (10YR 6/2) silt loam; massive structure; very friable; common medium prominent black (10YR 2/1), moist, iron and manganese masses with sharp boundaries in matrix; and common medium faint pale brown (10YR 6/3), moist, and common medium prominent strong brown (7.5YR 5/6), moist, masses of oxidized iron with clear boundaries in matrix; strongly acid (pH 5.5).

Belknap silt loam; 07KY-033-01

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-18	**Ap**	0.3	0.6	0.8	0.9	1.8	4.4	80.7	14.9	SIL
18-56	**Bw**	0.6	0.7	0.6	0.8	1.4	4.1	76.2	19.7	SIL
56-100	**Bg_1**	1.1	1.7	1.3	1.4	2.6	8.1	71.5	20.4	SIL
100-150	**Bg_2**	1.1	1.6	1.5	1.8	3.7	9.7	68.5	21.8	SIL
150-220	**Cg**	0.5	0.9	1.2	2.3	6.3	11.2	69.0	19.8	SIL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL –silty clay loam, SIC – silty clay, CL – clay loam.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	4.8												
Bw	5.2												
Bg_1	5.1												
Bg_2	5.2												
Cg	5.1		3.8	1.9	0.1		5.8	10.0	7.7	58			

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 07KY-067-02
Soil Name As Correlated: Bluegrass, silt loam
Classification: Fine-silty, mixed, active, mesic Typic Paleudalfs

Description Date: **Describers:** Steve Blanford and Bob Eigel
Location Description: Fayette Co, KY; 500 feet east of James Lane, 0.75 mile southwest of the intersection of James Lane and Military Pike, and 0.75 mile southeast of Little Texas. Versailles USGS quadrangle.

Landscape Position: Upland
Drainage: Well drained
Primary Earth Cover:
Parent Materials: Limestone residuum

Ap – 0-30 cm; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure parting to moderate fine granular structure; very friable; common fine roots throughout; slightly acid; gradual smooth boundary.

Bt_1 – 30-66 cm; dark yellowish brown (10YR 4/6) silt loam; moderate medium subangular blocky structure parting to moderate fine subangular blocky structure; very friable; few fine roots throughout; common discontinuous faint clay films on vertical faces of peds; few fine prominent spherical weakly cemented, black (7.5YR 2.5/1), moist, iron-manganese nodules with sharp boundaries in matrix; moderately acid; clear smooth boundary.

Bt_2 – 66-89 cm; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots throughout; common discontinuous distinct clay films on vertical faces of peds; few fine prominent spherical weakly cemented black (7.5YR 2.5/1), moist, iron-manganese nodules with sharp boundaries in matrix, and few fine prominent irregular, black (7.5YR 2.5/1), moist, manganese masses with sharp boundaries between peds; moderately acid; clear smooth boundary.

$2Bt_3$ – 89-160 cm; yellowish red (5YR 4/6) silty clay loam; strong medium subangular blocky structure; firm; common discontinuous distinct clay films on vertical faces of peds; few fine prominent spherical weakly cemented, black (7.5YR 2.5/1) moist, iron-manganese nodules with sharp boundaries in matrix, and few fine prominent irregular, black (7.5YR 2.5/1) moist manganese masses with sharp boundaries between peds; moderately acid; clear smooth boundary.

$2Bt_4$ – 160-213 cm; yellowish red (5YR 4/6) silty clay; 5 percent medium prominent irregular light yellowish brown (2.5Y 6/4) mottles; moderate medium subangular blocky structure; firm; common discontinuous distinct clay films on vertical faces of peds; few fine prominent spherical weakly cemented, black (7.5YR 2.5/1) moist, iron-manganese nodules with sharp boundaries in matrix, and few fine prominent irregular, black (7.5YR 2.5/1) moist, manganese masses with sharp boundaries between peds; moderately acid; clear smooth boundary.

2BC – 213-244 cm; yellowish red (5YR 4/6) silty clay; 20 percent medium prominent irregular light yellowish brown (2.5Y 6/4) mottles; weak medium subangular blocky structure; very firm; few discontinuous distinct clay films on vertical faces of peds; many fine prominent spherical weakly cemented, black (7.5YR 2.5/1) moist, iron-manganese nodules with sharp boundaries in matrix, and many fine prominent irregular, black (7.5YR 2.5/1) moist manganese masses with sharp boundaries between peds; moderately acid.

Bluegrass silt loam; 07KY-067-02

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-30	**Ap**	1.0	1.7	1.7	1.2	1.0	6.6	76.3	17.1	SIL
30-66	**Bt_1**	0.8	1.2	1.0	0.6	0.7	4.3	67.1	28.6	SICL/SIL
66-89	**Bt_2**	1.6	2.5	1.4	0.5	0.8	6.8	64.2	29.0	SICL/SIL
89-160	**$2Bt_3$**	2.5	3.2	1.6	0.7	0.9	8.9	54.5	36.6	SICL
160-213	**$2Bt_4$**	2.7	2.5	1.4	1.2	1.5	9.3	53.3	37.4	SICL
213-244	**2BC**	1.4	2.2	3.0	5.1	3.9	15.6	38.4	46.0	SIC/C

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	7.1		9.2	1.3	0.3	0.1	10.9	11.8	5.6	92	0.8	2.6	53
Bt_1	6.5		6.0	1.6	0.3	0.1	8.0	12.0	7.1	67	0.1	0.7	72
Bt_2	6.1		6.0	1.0	0.2	0.1	7.3	13.3	8.2	55	0.1	0.4	54
$2Bt_3$	5.0		4.1	1.3	0.3	0.1	5.8	14.8	14.1	39	0.1	0.4	82
$2Bt_4$	5.4		5.2	1.8	0.5	0.1	7.6	14.9	12.2	51	0.1	0.3	250
2BC	5.8		8.3	2.0	0.5	0.1	10.9	19.8	12.7	55	0.4	0.3	326

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Clay Mineralogy

Horizon	Clay Mineral Content (%)										
	SM	V	V/HIV	CL	INT	K	MI	Q	GI	GO	F
Bt_1	27	20				23	13	12			5
Bt_2	19	28			10	19	13	8			3

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; GO = goethite; GI = gibbsite; F = feldspars.

Pedon ID: 08KY-239-01
Soil Name As Correlated: Bluegrass, silt loam
Classification: Fine-silty, mixed, active, mesic Typic Paleudalfs

Description Date: 03/24/2008 **Describers:** Steve Blanford and Bob Eigel
Location Description: Woodford Co, KY; in a pasture field 0.75 miles north of the maintenance barn on UK Woodford County Research Farm (formerly Pin Oak Farm), 2.0 miles north of the intersection of U. S. Hwy 60 and 62, 3.0 miles north of Versailles, Ky.

Landscape Position: Summit of interfluve of ridge on karst upland
Slope: 2 percent
Drainage: Well drained
Primary Earth Cover: Grass/ herbaceous cover in pasture
Parent Materials: Clayey residuum weathered from phosphatic limestone

Ap – 0-20 cm; brown (10YR 4/3) silt loam; moderate medium granular parting to moderate fine granular structure; very friable; common fine roots throughout; neutral; pH 7.0, Hellige-Truog; gradual smooth boundary.

AB – 20-30 cm; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky parting to moderate fine granular structure; friable; few fine roots throughout; slightly acid; pH 6.5; gradual smooth boundary.

Bt$_1$ – 30-51cm; strong brown (7.5YR 4/6) silty clay loam; 35 percent clay; moderate medium subangular blocky parting to moderate fine subangular blocky structure; firm; few fine roots between peds; 40 percent discontinuous distinct clay films on vertical faces of peds; 1 percent fine prominent spherical moderately cemented black (7.5YR 2.5/1), moist iron-manganese nodules with sharp boundaries in matrix, and 1 percent fine prominent irregular black (7.5YR 2.5/1), moist, manganese masses with sharp boundaries in matrix; slightly acid, pH 6.5; gradual smooth boundary.

Bt$_2$ – 51-100 cm; strong brown (7.5YR 4/6) silty clay; moderate medium subangular blocky and moderate coarse subangular blocky structure; very firm; few fine roots between peds; 45 percent discontinuous distinct clay films on vertical faces of peds; 5 percent fine prominent spherical moderately cemented black (7.5YR 2.5/1), moist iron-manganese nodules with sharp boundaries in matrix, and 5 percent fine prominent irregular black (7.5YR 2.5/1) , moist, manganese masses with sharp boundaries in matrix; slightly acid, pH 6.5; gradual smooth boundary.

Bt$_3$ – 100-150 cm; reddish brown (5YR 4/4) silty clay; moderate medium subangular blocky and moderate coarse subangular blocky structure; very firm; 45 percent discontinuous distinct clay films on surfaces along pores; 3 percent medium prominent spherical moderately cemented black (7.5YR 2.5/1) , moist iron-manganese nodules with sharp boundaries between peds, and 3 percent fine prominent irregular black (7.5YR 2.5/1), moist manganese masses with sharp boundaries between peds, and 3 percent fine prominent spherical moderately cemented black (7.5YR 2.5/1) moist, iron-manganese nodules with sharp boundaries between peds, and 3 percent medium prominent irregular black (7.5YR 2.5/1), moist manganese masses with sharp boundaries between peds; moderately acid, pH 6.0; gradual smooth boundary.

Bt$_4$ – 150-213 cm; reddish brown (2.5YR 4/4) silty clay; strong medium subangular blocky and strong fine subangular blocky structure; very firm; 70 percent continuous distinct clay films on surfaces along pores; 6 percent fine prominent spherical moderately cemented black (7.5YR 2.5/1) moist, iron-manganese nodules with sharp boundaries between peds, and 6 percent fine prominent irregular black (7.5YR 2.5/1), moist, manganese masses with sharp boundaries between peds, and 6 percent medium prominent spherical moderately cemented black (7.5YR 2.5/1), moist, iron-manganese nodules with sharp boundaries between peds, and 6 percent medium prominent irregular black (7.5YR 2.5/1), moist, manganese masses with sharp boundaries between peds; strongly acid; pH 5.5; abrupt smooth boundary.

BC – 213-254 cm; reddish brown (5YR 4/4) silty clay; 10 percent pale brown (10YR 6/3) mottles; 10 percent medium prominent light gray (2.5Y 7/2) mottles; weak medium subangular blocky structure; very firm; 10 percent medium prominent spherical moderately cemented black (7.5YR 2.5/1), moist, iron-manganese nodules with sharp boundaries between peds, and 10 percent medium prominent irregular black (7.5YR 2.5/1) moist, manganese masses with sharp boundaries between peds, and 10 percent coarse prominent spherical moderately cemented black (7.5YR 2.5/1) moist, iron-manganese nodules with sharp boundaries between peds, and 10 percent coarse prominent irregular black (7.5YR 2.5/1), moist, manganese masses with sharp boundaries between peds; strongly acid, pH 5.5.

Bluegrass silt loam; 08KY-239-01

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-20	**Ap**	1.3	2.5	2.1	1.6	1.4	8.9	80.0	11.1	SIL/SI
20-30	**AB**	0.7	1.7	1.4	0.7	0.8	5.3	76.4	18.3	SIL
30-51	**Bt_1**	1.4	2.0	1.1	0.6	0.7	5.8	59.1	35.1	SICL
51-100	**Bt_2**	0.9	2.3	1.4	0.7	0.8	6.1	57.7	36.2	SICL
100-150	**Bt_3**	1.9	2.6	1.4	0.7	0.8	7.4	51.4	41.2	SIC
150-213	**Bt_4**	1.2	1.8	1.1	1.6	1.8	7.5	33.9	58.6	C
213-254	**BC**	1.9	3.3	5.6	9.1	4.8	24.7	26.5	48.8	C

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	6.5		8.4	1.5	0.5	0.1	10.5	13.7	8.0	77	0.9	3.2	126
AB	6.3		5.8	0.9	0.4	0.1	7.2	11.1	8.3	65	0.1	1.7	99
Bt_1	6.3		6.2	0.9	0.3	0.1	7.5	13.2	8.5	57	0.1	0.6	130
Bt_2	5.8		6.5	0.8	0.3	0.1	7.7	15.2	12.1	51	0.1	0.5	78
Bt_3	4.8		5.3	0.5	0.3	0.1	6.2	16.7	18.2	37	4.6	0.5	125
Bt_4	4.8		8.6	1.2	0.3	0.1	10.2	27.0	25.7	38	0.2	0.5	354
BC	5.0		7.9	0.9	0.2	0.1	9.1	21.8	23.4	42	0.4	0.5	400

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Clay Mineralogy

Horizon	Clay Mineral Content (%)										
	SM	V	V/HIV	CL	INT	K	MI	Q	GI	GO	F
Bt_1	23	20			16	18	11	7			5
Bt_2	22	36			3	14	14	7			4

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; GO = goethite; GI = gibbsite; F = feldspars.

Pedon ID: 94KY-135-55
Soil Name As Correlated: Caneyville, silty clay loam
Classification: Fine, mixed, active, mesic Typic Hapludalfs

Description Date: 1994 **Describer:** S. Jacobs
Location Description: Lewis County, KY.

Landscape Position: Upland
Slope:
Drainage:
Primary Earth Cover:
Existing Vegetation:
Parent Materials: Dolomite

A—0 -8 cm; dark brown (10YR 4/3) silty clay loam; weak fine granular structure; friable; many fine, few medium and coarse roots; 10% dolomite fragments; medium acid; gradual smooth boundary.

Bt$_1$ – 8-25 cm; strong brown (7.5YR 4/6) clay; moderate medium subangular and angular blocky structure; firm; common fine, few medium and coarse roots; 10% dolomite fragments; many distinct clay films on peds; strongly acid; gradual smooth boundary.

Bt$_2$ –25-60 cm; strong brown (7.5YR 5/6) gravelly clay; moderate medium and coarse subangular and angular blocky structure; very firm; common fine, few medium and coarse roots; 30% dolomite fragments; many distinct and prominent clay films on peds; neutral; abrupt smooth boundary.

R – 60 cm; hard dolomite bedrock.

Caneyville silty clay loam; 94KY-135-55

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-8	**A**	1.7	4.6	4.2	4.5	9.3	24.3	50.7	25.0	SIL/L/CL
8-25	**Bt_1**	0.5	0.6	0.8	2.1	11.1	15.1	40.9	44.0	SIC/C
25-60	**Bt_2**	0.1	0.3	0.5	1.3	8.9	11.1	43.0	45.9	SIC

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
A													
Bt_1													
Bt_2													

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Clay Mineralogy

Horizon	Clay Mineral Content (%)										
	SM	V	V/HIV	CL	INT	K	MI	Q	GI	GO	F
Bt_1		17			18	38	23	4			
Bt_2		21			22	28	24	4			1

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; GO = goethite; GI = gibbsite; F = feldspars.

Pedon ID: 76KY-033-01
Soil Name As Correlated: Crider, silt loam
Classification: Fine-silty, mixed, active, mesic Typic Paleudalfs

Description Date: 10/29/1976 **Describers:** J. H. Newton and H. H. Bailey
Location Description Caldwell County, KY; on the West Kentucky Agricultural Experiment Station in the northwest corner of field number 105, 25 feet south of field number 106, 50 feet east of field, T1, 1100 feet southwest of Ky Hwy 91, about 1 mile southeast of Princeton.

Landscape Position: Upland karst plain
Slope: 4 percent
Drainage: Well drained
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Bluegass sod
Parent Materials: Loess mantle over residuum from limestone.

Ap—0 -22 cm; brown (7.5YR 4/4) silt loam; weak fine and medium granular structure; very friable; many fine roots; common fine pores; medium acid; abrupt smooth boundary.

Bt$_1$ – 23-36 cm; strong brown (7.5YR 5/6) silty clay loam; moderate medium angular blocky structure parting to fine and very fine angular blocky; friable; common fine roots; few fine pores; nearly continuous thin clay films; medium acid; clear smooth boundary.

Bt$_2$ –36-52 cm; yellowish red (5YR 4/6) silty clay loam; moderate medium angular blocky structure parting to fine and very fine angular blocky; friable; few fine roots; few fine pores; nearly continuous thin clay films; few black films and few small black soft nodules less than 1 mm in diameter; very strongly acid; gradual smooth boundary.

Bt$_3$ – 52-66 cm; yellowish red (5YR 5/6) silty clay loam; moderate medium angular blocky structure parting to fine and very fine angular blocky; friable; few fine roots; few fine pores; nearly continuous thin reddish brown clay films; common black films and few small black soft nodules less than 1 mm in diameter; few thin light brown sil coatings; very strongly acid; gradual smooth boundary.

Bt$_4$ – 66-91 cm; yellowish red (5YR 4/6) silty clay loam; moderate medium angular block structure parting to fine and very fine angular blocky; friable; few fine roots; few fine pores; nearly continuous thin reddish brown clay films; common black films; strongly acid; clear smooth boundary.

2Bt$_5$ – 91-165 cm; yellowish red (5YR 4/6) silty clay; moderate medium angular blocky structure parting to fine and very fine angular blocky; firm; few fine pores; nearly continuous thin reddish brown clay films; many black films; few small black concretions; medium acid; clear smooth boundary.

2BC – 165-175 cm; brown (7.5YR 4/4) clay; common medium distinct grayish brown and strong brown mottles; weak medium angular blocky structure; firm; few discontinuous clay films; neutral; abrupt smooth boundary.

R – 175+cm; hard gray limestone.

Crider silt loam; 76KY-033-01

Particle Size Analysis

Depth (cm)	Horizon	Sand Fractions (%) VCS	CS	MS	FS	VFS	Total (%) Sand	Silt	Clay	Textural Class
0-22	**Ap**	0.1	0.1	0.2	0.6	0.5	1.5	77.5	21.0	SIL
22-36	**Bt_1**	0.1	0.1	0.1	0.3	0.2	0.8	64.5	34.7	SICL
36-52	**Bt_2**	0.1	0.1	0.1	0.4	0.3	1.0	64.1	34.9	SICL
52-66	**Bt_3**	0.4	0.3	0.2	0.8	0.5	2.2	65.3	32.5	SICL
66-91	**Bt_4**	0.3	0.5	0.5	1.2	0.7	3.2	64.5	32.3	SICL
91-165	**$2Bt_5$**	1.3	1.5	0.9	1.8	1.0	6.5	53.8	39.7	SIC
165-175	**2BC**	0.3	0.2	0.3	0.8	1.2	2.8	47.1	50.1	SIC

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH 1:1 Water	pH 1:1 KCl	Exchangeable Bases (meq/100 g) Ca	Mg	K	Na	Sum of Bases (meq/ 100 g)	CEC (meq/ 100 g)	Ext. Acid. (meq/ 100 g)	Base Sat (%)	$CaCO_3$ Eq. (%)	OM (%)	Bray P (mg/L)
Ap	5.8	4.8	8.4	1.9	0.2	0.1	10.6	10.5	19.1	100+	0.6	2.4	3.0
Bt_1	6.0	4.8	10.5	3.3	0.3	0.1	14.2	15.8	23.1	90	0.3	0.7	1.0
Bt_2	5.3	4.0	7.0	3.4	0.3	0.1	10.8	14.6	25.1	74	0.5	0.3	1.0
Bt_3	5.1	3.8	4.5	3.4	0.3	0.1	8.3	13.5	24.6	61	0.5	0.2	1.5
Bt_4	5.2	3.7	3.7	3.2	0.3	0.1	7.3	13.4	25.4	54	0.5	0.2	2.0
$2Bt_5$	5.1	3.6	7.0	3.4	0.4	0.1	10.9	17.5	26.3	62	0.5	0.3	1.5
2BC	7.0	6.3	21.6	6.8	0.4	0.2	29.0	23.8	17.7	100+	0.9	0.5	2.5

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 98KY-015-UK1
Soil Name As Correlated: Eden, silty clay loam
Classification: Fine, mixed, active, mesic Typic Hapludalfs

Description Date: 9/09/1998 **Describer:** A. D. Karathanasis
Location Description: Boone County, KY; Randall Farm, Hwy 20 east of Petersburg.

Landscape Position: Upland, backslope
Slope: 15 percent
Drainage: Well drained
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation:
Parent Materials: Residuum weathered from calcareous shale and/or residuum weathered from limestone and/or residuum weathered from siltstone.
Restrictions: Lithic bedrock: 77 cm.

Ap --- 0-17 cm; very dark grayish brown (10YR 3/2) moist, silty clay loam; weak granular structure; friable; clear smooth boundary.

Bt_1 --- 17-31 cm; yellowish brown (10YR 5/4) moist, silty clay; 1 percent brown (10YR 4/3) mottles; weak subangular blocky structure; firm; gradual wavy boundary.

Bt_2 --- 31-56 cm; yellowish brown (10YR 5/4) moist, clay; 30 percent brownish yellow (10YR 6/6) mottles; weak subangular blocky structure; firm; gradual wavy boundary.

BC --- 56-77 cm; yellowish brown (10YR 5/4) moist, clay; 1 percent dark yellowish brown (10YR 4/6) and 1 percent very dark grayish brown (10YR 3/2) mottles; weak subangular blocky structure; firm; 1 percent (few) pale red (2.5YR 6/2), moist, iron depletions; gradual wavy boundary.

Cr --- 77 cm.

Eden silty clay loam; 98KY-015-UK1

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-17	**Ap**	1.1	2.5	2.8	2.7	3.2	12.3	53.8	33.9	SICL
17-31	**Bt_1**	0.6	1.0	1.3	1.7	1.8	6.4	43.7	49.9	SIC
31-56	**Bt_2**	1.6	2.2	2.5	4.0	2.4	12.7	37.3	50.0	C
56-77	**BC**	2.0	2.9	2.5	2.1	2.0	11.5	39.3	49.2	C

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	6.4		24.3	2.0	0.3	0.1	26.7	29.4	9.4	91	0.3	5.2	78
Bt_1	7.6		39.2	1.4	0.2	0.1	40.9	29.4	4.4	100+	4.0	2.4	20
Bt_2	8.1		34.2	0.5	0.2	0.1	35.0	17.6	1.9	100+	9.9	2.6	19
BC	8.2		35.7	0.4	0.1	0.1	36.3	14.7	2.2	100+	11.0	3.8	31

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Clay Mineralogy`

Horizon	Clay Mineral Content (%)										
	SM	V	V/HIV	CL	INT	K	MI	Q	GI	GO	F
Bt_2		66			13	4	16	1			
BC		84				4	10	2			

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; GO = goethite; GI = gibbsite; F = feldspars.

Pedon ID: 04KY-025-UK1
Soil Name As Correlated: Fairpoint, channery loam
Classification: Loamy-skeletal, mixed, active, nonacid, mesic Typic Udorthents

Description Date: 07/28/2004 **Describers:** Steve Blanford
Location Description: Breathitt County, Ky; Robinson Forest; reclaimed strip mine area-Buckhorn Creek. Latitude: 37.420N; Longitude: 83.183W

Landscape Position: Upland, ridgetop
Slope: 2 percent
Drainage:
Primary Earth Cover: Grass/herbaceous cover
Existing vegetation: Red clover
Parent Materials: Breathitt Formation (Pennsylvanian), reclaimed coal mine spoil.

Ap – 0-28 cm; very dark grayish brown (10YR 3/2) channery loam; weak fine and medium subangular blocky structure; very friable; many fine roots; 25% sandstone, siltstone and shale channers; 5% sandstone flagstones; clear wavy boundary.

C_1—28-64 cm; very dark gray (10YR 3/1) very channery silt loam; massive; firm; common fine roots; 40% sandstone, siltstone and shale channers; 10% sandstone flagstones, clear wavy boundary.

C_2 – 64-81 cm; 60% dark gray (2.5Y 4/1) and 40% yellowish brown (10YR 5/8) very channery silt loam; massive; very firm; few fine roots; 30% sandstone, siltstone and shale channers; 10% sandstone flagstones; and 10% channer-size coal fragments; clear wavy boundary.

C_3 – 81-104 cm; 60% yellowish brown (10YR 5/8) and 40% dark gray (2.5Y 4/1) extremely channery silt loam; massive; very firm; few fine roots; 30% sandstone, siltstone and shale channers; 10% sandstone flagstones; and 20% channer-size coal fragments; clear wavy boundary.

C_4 – 104-130 cm; dark grayish brown (2.5Y 4/2) extremely flaggy silt loam; massive; very firm; few very fine roots; 20% sandstone, siltstone and shale channers; 50% sandstone flagstones; and 7% channer-size coal fragments; gradual wavy boundary.

C_5 – 130-147 cm; dark grayish brown (2.5Y 4/2) extremely flaggy clay loam; massive; very firm; few very fine roots; 15% sandstone, siltstone and shale channers; 45% flagstones, and 7% channer-size coal fragments; gradual wavy boundary.

C_6—147-183+ cm; yellowish brown (10YR 5/8) extremely flaggy loam; common medium prominent dark grayish brown (2.5Y 4/2) mottles; very firm; 15% sandstone, siltstone, and shale channers; 45% sandstone flagstones; 7% channer-size coal fragments; and 5% sandstone stones.

Fairpoint channery loam; 04KY-025-UK1

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-28	**Ap**	5.1	5.6	6.9	7.3	7.4	32.3	46.1	21.6	L/SIL
28-64	**C_1**	4.8	5.5	4.8	6.2	7.2	28.5	48.2	23.3	L/SIL
64-81	**C_2**	5.7	5.2	5.5	5.9	7.2	29.5	46.4	24.1	L
81-104	**C_3**	4.9	5.9	5.9	7.2	9.0	32.9	45.3	21.8	L
104-130	**C_4**	4.1	5.3	5.2	5.5	6.9	27.0	48.9	24.1	SIL/L
130-147	**C_5**	6.7	7.0	4.4	5.0	8.4	31.5	50.7	17.8	L
147-183+	**C_6**	11.4	8.5	6.5	6.4	9.0	41.8	43.5	14.7	L

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand;
SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	7.1		5.0	6.6	0.2	0.1	11.9	11.8	3.3	100			
C_1	7.8		4.4	5.5	0.2	0.1	10.2	8.7	1.5	100+			
C_2	7.7		4.5	5.6	0.3	0.1	10.5	9.0	1.4	100+			
C_3	6.9		4.3	6.5	0.2	0.1	11.1	11.3	4.7	98			
C_4	7.5		4.2	5.5	0.2	0.1	10.0	9.5	2.1	100+			
C_5	7.8		4.1	5.4	0.2	0.1	9.8	7.6	1.4	100+			
C_6	7.9		3.7	5.2	0.2	0.1	9.2	6.8	0.6	100+			

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Sand + Silt Mineralogy

Horizon	Sand + Silt Mineral Content (%)				
	Quartz	Feldspar	Mica	Kaolinite	Vermiculite
C_1	22	4	48	15	11
C_2	15	20	43	13	9

Pedon ID: 08KY- 239-03
Soil Name As Correlated: Faywood, silt loam
Classification: Fine, mixed, active, mesic Typic Hapludalfs

Description Date: **Describers:** Steve Blanford and Bob Eigel
Location Description Woodford County, KY; 290 yards south of Scott's Ferry Road, about 0.25 miles east of the junction of Scott's Ferry Road and KY Hwy 1964; about 3.8 miles southwest of Versailles, KY. USGS Tyrone quadrangle. (UTM Easting 696602 UTM Northing 4208922).
Lat: 38° 0' 24" N Long: 84° 45' 38" W

Landscape Position: Upland
Slope: 10 percent
Drainage: Well drained
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Pasture
Parent Materials: Limestone residuum interbedded with thin layers of shale

Ap—0 -15 cm; dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; very friable; many fine roots throughout; neutral; clear smooth boundary.

Bt_1 – 15-46 cm; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; moderately sticky; slightly plastic; common fine roots throughout; 30 percent discontinuous faint clay films on faces of peds and in pores; 1 percent fine prominent spherical weakly cemented black (7.5YR 2.5/1) iron-manganese concretions with sharp boundaries throughout; slightly acid; gradual wavy boundary.

Bt_2 –46-76 cm; yellowish brown (10YR 5/6) silty clay; 5 percent fine distinct pale brown (10YR 6/3), 5 percent fine distinct light olive brown (2.5Y 5/4), and 5 percent fine faint strong brown (7.5YR 5/6) redox concretions; moderate medium angular blocky structure; very firm; very sticky; moderately plastic; few fine roots between peds; 30 percent continuous faint clay films on vertical faces of peds; 1 percent fine prominent spherical weakly cemented black (7.5YR 2.5/1) iron-manganese concretions with sharp boundaries throughout; neutral; abrupt smooth boundary.

R – 76 cm—hard light gray limestone and interbedded thin layers of shale.

Faywood silt loam; 08KY-239-03

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-15	**Ap**	1.5	3.4	3.7	3.1	2.8	14.5	72.4	13.1	SIL
15-46	**Bt_1**	2.4	2.7	1.8	1.5	2.3	10.7	59.0	30.3	SICL
46-76	**Bt_2**	1.7	1.4	1.3	1.3	2.7	8.4	38.5	53.1	SIC

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	6.6		8.9	1.5	0.6	0.1	11.1	16.1	9.2	69	0.18	3.99	147
Bt_1	6.1		6.7	0.4	0.1	0.1	7.3	14.3	9.1	51	0.05	0.53	393
Bt_2	6.8		19.0	0.8	0.2	0.1	20.1	27.0	7.9	74	0.35	0.79	284

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Clay Mineralogy

Horizon	Clay Mineral Content (%)										
	SM	V	V/HIV	CL	INT	K	MI	Q	GI	GO	F
Bt_1	20		28		15	15	10	10			2
Bt_2	10		25		27	10	20	5			3

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; GO = goethite; GI = gibbsite; F = feldspars.

Pedon ID: 03KY-145-001
Soil Name As Correlated: Feliciana, silt loam, eroded
Classification: Fine-silty, mixed, active, thermic Ultic Hapludalfs

Description Date: 8/12/2003 **Describer:** J. E. McIntosh
Location Description: McCracken County, KY; 2.5 miles east of Lovelaceville at the end of Trice Road.

Landscape Position: Upland, summit
Slope: 4 percent
Drainage: Well drained
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: tall fescue (*Lolium arundinaceum*); Johnsongrass (*Sorghum halepense*)
Parent Materials: Loess

Ap --- 0-10 cm brown (10YR 4/3) moist, silt loam; weak medium granular structure; very friable; many fine roots; slightly acid, pH 6.3; abrupt smooth boundary.

Bt_1 --- 10-33 cm; strong brown (7.5YR 4/6) moist, silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; 30 percent (common) distinct brown (7.5YR 4/3), moist, clay films on surfaces along pores and 30 percent (common) distinct brown (7.5YR 4/3), moist, clay films on all faces of peds; moderately acid, pH 6; clear smooth boundary.

Bt_2 --- 33-71 cm; strong brown (7.5YR 4/6) moist, silty clay loam silt loam; moderate medium subangular blocky structure; firm; moderately few fine roots; 30 percent (common) distinct brown (7.5YR 4/3), moist, clay films on surfaces along pores and 30 percent (common) distinct brown (7.5YR 4/3), moist, clay films on all faces of peds; 2 percent (common) prominent black (N 2.5/), moist, manganese coatings infused into matrix along faces of peds; moderately acid, pH 6; clear smooth boundary.

Bt_3 --- 71-122 cm; strong brown (7.5YR 4/6) moist, silt loam; moderate medium subangular blocky structure; friable; moderately few fine roots; 30 percent (common) distinct brown (7.5YR 4/3), moist, clay films on surfaces along pores and 30 percent (common) distinct brown (7.5YR 4/3), moist, clay films on all faces of peds; 1 percent (few) prominent black (N 2.5/), moist, manganese coatings infused into matrix along faces of peds, and 5 percent (common) prominent light yellowish brown (2.5Y 6/3), moist and light gray (10YR 7/1), dry, clay depletions infused into matrix along faces of peds; moderately acid, pH 5.6; gradual smooth boundary.

Bt_4 --- 122-165 cm; strong brown (7.5YR 4/6) moist, silt loam; moderate medium subangular blocky and moderate fine subangular blocky structure; friable; very few fine roots; 10 percent (few) distinct brown (7.5YR 4/4), moist, clay films on all faces of peds; 5 percent (common) prominent light yellowish brown (2.5Y 6/3), moist and light gray (10YR 7/1), dry, clay depletions infused into matrix along faces of peds; strongly acid, pH 5.4; gradual smooth boundary.

BC --- 165 to 203 cm; strong brown (7.5YR 4/6) moist, silt loam; weak medium subangular blocky structure; friable; 2 percent (common) prominent light yellowish brown (2.5Y 6/3), moist and light gray (10YR 7/1), dry, clay depletions infused into matrix along faces of peds; strongly acid, pH 5.4.

Feliciana silt loam; 03KY-145-001

Particle Size Analysis

Depth (cm)	Horizon	Sand Fractions (%) VCS	CS	MS	FS	VFS	Total (%) Sand	Silt	Clay	Textural Class
0-10	Ap									
10-33	Bt_1									
33-71	Bt_2									
71-122	Bt_3									
122-165	Bt_4									
165-203	BC									

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam

Chemical Properties

Horizon	pH 1:1 Water	pH 1:1 KCl	Exchangeable Bases (meq/100 g) Ca	Mg	K	Na	Sum of Bases (meq/ 100 g)	CEC (meq/ 100 g)	Ext. Acid. (meq/ 100 g)	Base Sat (%)	$CaCO_3$ Eq. (%)	OM (%)	Bray P (mg/L)
Ap													
Bt_1			7.1	2.7	0.4	0.1	10.3	13.7	7.2	75			
Bt_2			7.5	3.7	0.4	0.1	11.7	14.9	9.3	78			
Bt_3			3.1	3.2	0.3	0.1	6.6	11.6	9.9	57			
Bt_4			2.2	3.8	0.1	0.1	6.2	10.8	9.4	58			
BC			2.6	4.0	0.1	0.2	6.8	10.6	7.6	64			

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 83KY-099-03
Soil Name As Correlated: Frederick, silt loam
Classification: Fine, mixed, semiactive, mesic Typic Paleudults

Description Date: 05/24/1983 **Describers:** Carl Hail, Arlin Barton
Location Description Hart County, KY; approximately 8.5 miles east of Munfordville, 0.9 mile east of US Hwy 31E, and 300 feet east of Figett Bend Road.

Landscape Position: Upland, convex ridge
Slope: 7 percent
Drainage:
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Fescue, weeds
Parent Materials: Limestone interbedded with siltstone and shale

Ap—0 -20 cm; dark brown (7.5YR 4/4 silt loam; weak medium subangular blocky parting to moderate medium granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

Bt_1 – 20-50 cm; dark red (2.5YR 3/6) silty clay; moderate medium subangular blocky structure; firm; common fine roots; common distinct clay films on faces of peds and root channels; 10 percent angular chert pebbles; very strongly acid; gradual smooth boundary.

Bt_2 –50 -94 cm; dark red (2.5YR 3/6) silty clay; moderate coarse subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; 12 percent angular chert pebbles from 1-8 cm in diameter; very strongly acid; gradual smooth boundary.

Bt_3 –94-127 cm; dark red (2.5YR 3/6) gravelly clay; moderate coarse subangular blocky structure parting to moderate fine subangular blocky structure; firm; common distinct clay films on faces of peds; 15 percent chert pebbles; very strongly acid; gradual smooth boundary.

Bt_4 –127-190 cm; red (2.5YR 4/6) gravelly clay; few fine distinct yellowish red (5YR 5/6) mottles; moderate coarse subangular blocky structure parting to moderate fine subangular blocky structure; firm; common distinct clay films on faces of peds; 20 percent angular chert pebbles; strongly acid.

Frederick silt loam; 83KY-099-03

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-20	**Ap**	1.4	2.0	6.4	16.1	5.2	31.1	50.7	18.2	SIL
20-50	**Bt_1**	0.8	1.2	6.6	17.9	5.5	32.0	24.9	43.1	C
50-94	**Bt_2**	1.0	1.3	6.6	20.5	6.1	35.5	19.8	44.7	C
94-127	**Bt_3**	0.8	1.0	6.5	20.5	6.8	35.6	22.4	42.0	C
127-190	**Bt_4**	0.7	1.2	6.1	18.8	6.2	33.0	22.0	45.0	C

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	5.3	5.0	4.3	1.4	0.8	0.1	6.6	9.4	8.1	70		3.7	260
Bt_1	4.9	3.9	4.8	1.4	0.7	0.1	7.0	11.6	10.1	60		0.8	20
Bt_2	4.7	3.7	3.1	1.3	0.4	0.1	4.9	10.6	10.9	46		0.4	3
Bt_3	4.3	3.9	2.3	1.4	0.3	0.1	4.1	10.7	10.7	38		0.4	3
Bt_4	4.3	3.8	2.0	1.2	0.3	0.1	3.6	11.3	12.9	32		0.4	5

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Clay Mineralogy

Horizon	Clay Mineral Content (%)										
	SM	V	V/HIV	CL	INT	K	MI	Q	GI	GO	F
Bt_1		3	16			62	16	3			
Bt_2		6	10			67	13	4			

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; GO = goethite; GI = gibbsite; F = feldspars.

Pedon ID: 71KY-107-54
Soil Name As Correlated: Frondorf, loam
Classification: Fine-loamy, mixed, active, mesic Ultic Hapludalfs

Description Date: **Describers:**
Location Description: Hopkins Co, KY; 600 feet east of gravel road, 1 mile north of KY Hwy 1034, 1.5 miles east of KY Hwy 109, about 7 miles east of Madisonville.

Landscape Position: Upland
Slope: 25 percent
Drainage:
Primary Earth Cover:
Parent Materials: Loamy colluvium over residuum from sandstone, siltstone, and shale

A – 0 - 10 cm; very dark grayish-brown (10YR 3/2) loam; weak fine granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

AB— 10-25 cm; brown (10YR 5/3) loam; weak fine and medium subangular blocky structure; very friable; common fine roots; common pores; 5% sandstone fragments; strongly acid; clear smooth boundary.

BA – 25-36 cm; strong brown (7.5YR 5/6) silt loam; weak medium subangular blocky structure; friable; common fine roots; common pores; 10% sandstone fragments; strongly acid; clear smooth boundary.

Bt_1 – 36-50 cm; yellowish red (5YR 4/6) clay loam; moderate fine and medium angular blocky structure; firm; few fine roots; few pores; 10% sandstone fragments; many clay films; strongly acid; clear wavy boundary.

Bt_2 – 50 -71 cm; yellowish red (5YR 4/6) channery clay loam; moderate medium and coarse angular blocky structure; firm; few fine roots; few pores; 35% sandstone fragments; many clay films; very strongly acid; gradual smooth boundary.

BC_1 – 71 - 94 cm; strong brown (7.5YR 5/6) channery sandy clay loam; weak medium subangular and angular blocky structure; friable; common small pores; 35% sandstone fragments; few clay films; very strongly acid; clear wavy boundary.

BC_2 – 94-100 cm; strong brown (7.5YR 5/6) very channery sandy clay loam; weak medium angular blocky structure; 60% sandstone fragments; few clay films; very strongly acid; abrupt wavy boundary.

R – 100 cm; sandstone bedrock.

Frondorf loam; 71KY-107-54

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-10	**A**	0.1	0.3	2.6	24.8	10.0	37.8	51.9	10.3	SIL
10-25	**AB**	0.3	0.4	2.8	25.0	10.6	39.1	50.8	10.1	L/SIL
25-36	**BA**	0.9	1.5	4.5	29.8	11.9	48.6	40.6	10.8	L
36-50	**Bt_1**	0.1	0.3	6.6	26.7	9.3	43.0	39.1	17.9	L
50-71	**Bt_2**	0.6	1.8	10.6	27.2	9.7	49.9	29.5	20.6	L
71-94	**BC_1**	0.6	1.6	13.3	27.8	8.1	51.4	27.4	21.2	L/SCL
94-100	**BC_2**	4.5	5.4	8.6	26.7	8.1	53.3	24.8	21.9	SCL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
A	5.6	5.0	9.3	0.7	1.1		11.1	10.3		100+		6.4	19
AB	5.0	4.0	1.1	0.5	0.3		1.9	4.3		44		1.3	2
BA	5.1	3.9	0.5	1.9	0.3		2.7	5.0		54		0.4	1
Bt_1	5.2	3.9	0.2	1.6	0.9		2.7	7.1		38		0.3	0.5
Bt_2	5.1	3.8	0.2	2.4	0.8		3.4	5.9		58		0.2	0.5
BC_1	5.0	3.8	0.2	3.0	0.9		4.1	7.7		53		0.2	0.5
BC_2	5.0	3.9	0.2	3.2	0.9		4.3	9.4		46		0.1	0.5

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 75KY-207-03
Soil Name As Correlated: Garmon, channery silt loam
Classification: Fine-loamy, mixed, semiactive, mesic Dystric Eutrudepts

Description Date: 03/18/1975 **Describer:** J. H. Newton
Location Description: Russell County, KY; 75 feet south of gravel road, 1500 feet south of Wolf Creek Reservoir, 1.5 miles northwest of Jabez, about 13 miles southeast of Jamestown.

Landscape Position: Upland, north facing convex sideslope
Slope: 40 percent
Drainage:
Primary Earth Cover: Tree cover
Existing Vegetation: Mixed hardwoods
Parent Materials: Colluvium and residuum from siltstone

Oe – 1-0 cm; partially decomposed leaf litter.

A—0 -5 cm; brown (10YR 5/3) channery silt loam; weak fine granular structure; very friable; many fine roots; 15% thin flat fragments; medium acid; abrupt smooth boundary.

Bw$_1$ – 5-30 cm; light yellowish brown (10YR 6/4) channery silt loam; weak fine and medium subangular blocky structure; friable; common fine roots; 25% thin flat fragments; medium acid; clear smooth boundary.

Bw$_2$ –30-66 cm; yellowish brown (10YR 5/4) channery silt loam; weak medium subangular blocky structure; friable; few fine roots; 35% thin flat fragments; slightly acid; abrupt smooth boundary.

R – 66 cm; siltstone.

Garmon channery silt loam; 75KY-207-03

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-5	**A**	2.5	2.8	2.1	3.6	6.0	17.0	66.1	16.9	SIL
5-30	**Bw_1**	2.3	2.7	1.8	3.3	5.5	15.6	66.3	18.1	SIL
30-66	**Bw_2**	1.9	2.5	1.7	3.0	5.3	14.4	59.1	26.5	SIL/SICL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
A	4.6	3.6	0.8	0.2	0.1	0	1.1	7.5	9.8	15		2.1	2.7
Bw_1	5.1	3.9	1.3	0.6	0.1	0.1	2.1	5.8	7.0	36		1.2	1.4
Bw_2	5.6	4.3	2.1	2.9	0.1	0.1	5.2	8.2	6.3	63		0.6	0.8

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 72KY-025-10
Soil Name As Correlated: Gilpin, channery silt loam
Classification: Fine-loamy, mixed, active, mesic Typic Hapludults

Description Date: **Describers:**
Location Description: Breathitt Co, KY; Robinson Forest, south slope of traverse No.5-11S, upper 1/3 of slope.

Landscape Position: Upland
Slope:
Drainage:
Primary Earth Cover: Forest
Parent Materials: Residuum

Oa—1-0 cm; mostly decomposed leaf litter.

A – 0 - 5 cm; dark grayish-brown (10YR 4/2) channery silt loam; moderate fine granular structure; very friable; many fine roots; 15% siltstone fragments 5-25 cm across; strongly acid; abrupt smooth boundary.

AB— 5-13 cm; yellowish brown (10YR 5/4) channery silt loam; weak fine subangular blocky structure; very friable; many fine roots; 15% siltstone fragments; very strongly acid; clear smooth boundary.

Bt_1 – 13-28 cm; strong brown (7.5YR 5/6) channery silt loam; weak medium and fine angular and subangular blocky structure; friable; common fine roots; few small pores; few clay films; few clean sand grains on peds; 20% siltstone and few sandstone fragments; very strongly acid; clear smooth boundary.

Bt_2 – 28-51 cm; strong brown (7.5YR 5/6) channery silty clay loam; moderate fine and medium angular and subangular blocky structure; friable; few fine roots; 20% siltstone fragments mostly 2-15 cm, and a few up to 30 cm across; common clay films, few clean sand grains on peds; very strongly acid; clear smooth boundary.

Bt_3 – 51 - 71 cm; yellowish red (5YR 5/6) channery silty clay loam; moderate fine and medium angular blocky structure; firm; few fine roots; few small pores; 30% siltstone and sandstone fragments 2 to 30 cm across; many clay films on peds and coarse fragments; very strongly acid; abrupt smooth boundary.

R – 71 cm; grayish sandstone.

Gilpin channery silt loam; 72KY-025-10

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-5	**A**	0.1	0.6	0.9	6.4	21.0	29.0	55.4	15.6	SIL
5-13	**AB**	0.1	0.4	0.7	6.0	20.5	27.7	56.0	16.3	SIL
13-28	**Bt_1**	0.1	0.3	0.6	5.2	18.8	25.0	56.2	18.8	SIL
28-51	**Bt_2**	0.2	0.5	2.2	11.1	15.1	29.1	49.9	21.0	SIL
51-71	**Bt_3**	0.3	0.8	3.4	10.0	12.7	27.2	47.5	25.3	SIL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	CaCO 3 Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
A	4.6	4.0	1.4	0.4	0.2	0.1	2.1	15.6	0.2	13	31.1	7.8	5.5
AB	4.9	4.2	0.8	0.4	0.2	0.1	1.5	9.8	0.1	15	22.5	4.0	4
Bt_1	4.9	4.1	0.2	0.3	0.1	0.1	0.7	6.7	0.1	10	18.3	1.3	4
Bt_2	5.0	4.2	0.2	0.5	0.1	0.1	0.9	6.3	0.1	14	17.1	0.5	2.5
Bt_3	5.0	4.2	0.2	1.0	0.2	0.1	1.5	7.3	0.1	20	18.2	0.4	1.5

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 94KY-035-4-6
Soil Name As Correlated: Grenada, silt loam
Classification: Fine-silty, mixed, active, thermic Oxyaquic Fraglossudalfs

Description Date: 06/21/1994 **Describers:** A. D. Karathanasis, R. Forsythe, R. Toor, J. McIntosh
Location Description Calloway County, KY; southwest of Murray, KY; on the Jones Parker farm at the end of Sage Road in the Edgehill community.

Landscape Position: Upland
Slope: 8 percent
Drainage: Moderately well drained
Primary Earth Cover: Tree cover
Existing Vegetation: Upland hardwoods
Parent Materials: Loess /coastal plain sediments.

A—0 -18 cm; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; gradual smooth boundary.

BA – 18-48 cm; brown (7.5YR 4/4) silt loam; few fine faint brown (10YR 4/3) mottles; weak subangular blocky structure; friable; few fine roots; worm holes; clear smooth boundary.

Bt –48-81 cm; brown (7.5YR 4/4) silt loam; few fine prominent light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; few Mn stains; clear smooth boundary.

Bt_x – 81-110 cm; brown (7.5YR 4/4) and strong brown (7.5YR 5/6) silt loam; oxidized rhizosphere; common medium distinct light yellowish brown (10YR 6/4) and light brownish gray (10YR 6/2) mottles; weak coarse prismatic parting to moderate medium subangular blocky structure; firm; weak pan with discontinuous grayish brown (2.5Y 5/2) clay films; gradual wavy boundary.

Bt_{xg} – 110-152 cm; grayish brown (10YR 5/2) silt loam; many fine prominent strong brown (7.5YR 5/6) and few fine faint light gray (10YR 7/1) mottles; weak coarse prismatic parting to moderate medium subangular blocky structure; very firm; weak pan with discontinuous grayish brown (2.5Y 5/2) clay films; gradual wavy boundary.

$2Bt_x$ – 152-165+ cm; yellowish red (5YR 4/6), brown (10YR 5/3), and strong brown (7.5YR 5/6) loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak coarse prismatic structure; very firm.

Grenada silt loam; 76KY-035-01

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-18	**Ap**	0.6	3.4	6.4	4.6	1.6	16.6	71.2	12.2	SIL
18-48	**BA**	0.1	0.5	3.2	2.8	1.0	7.6	74.7	17.7	SIL
48-81	**Bt**	0.0	0.5	2.7	2.5	0.8	6.5	71.3	22.2	SIL
81-110	**Bt_x**	0.1	1.4	6.0	5.0	1.0	13.5	63.4	23.1	SIL
110-152	**Bt_{xg}**	0.2	1.3	8.8	7.4	1.4	19.1	55.5	25.4	SIL/SICL
152-165+	**$2Bt_x$**	0.1	3.2	21.1	19.1	2.3	45.8	26.4	27.8	CL/SCL/L

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	5.0		1.9	0.6	0.2	0.1	2.8	15.6	11.9	18		6.9	10
BA	5.2		1.1	0.4	0.1	0.1	1.7	11.0	5.4	15		1.1	4.5
Bt	5.1		0.5	1.5	0.1	0.1	2.2	13.0	9.1	17		0.7	3
Bt_x	5.0		0.4	1.5	0.1	0.1	2.1	15.2	11.2	14		0.4	3.5
Bt_{xg}	4.9		0.9	3.0	0.1	0.3	4.3	18.6	12.3	23		0.4	3.5
$2Bt_x$	5.3		5.9	2.5	0.1	0.3	8.8	16.2	7.8	55		0.3	3.5

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 06KY-101-01
Soil Name As Correlated: Hosmer, silt loam
Classification: Fine-silty, mixed, active, mesic Oxyaquic Fragiudalfs

Description Date: 04/12/2006 **Describers:** Eddie Tudor, Scott Aldridge
Location Description: Henderson Co, KY; about 2000 feet northwest of intersection of KY 145 and Dixie #2, and 150 feet south from the back left corner of barn. Lat: 37º 39' 14.00" N Long: 87º 40' 54.00" W

Landscape Position: Upland; on interfluve of ridge
Slope: 1 percent
Drainage: Moderately well drained
Existing Vegetation: Row crop
Parent Materials: Thick fine-silty loess

Ap – 0-25 cm; brown (10YR 4/3) silt loam; weak fine granular structure; friable; common fine roots throughout; abrupt wavy boundary.

Bt_1 – 25-50 cm; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; common fine roots throughout; 3 percent continuous distinct dark yellowish brown (10YR 4/4), moist, clay films on all faces of peds; abrupt wavy boundary.

Bt_2 – 50-66 cm; yellowish brown (10YR 5/4) silt loam; weak medium prismatic parting to moderate medium subangular blocky structure; friable; common fine roots throughout; 15 percent continuous distinct dark yellowish brown (10YR 4/4), moist, clay films on all faces of peds; 1 percent iron-manganese masses and 10 percent fine prominent strong brown (7.5YR 5/8), moist, masses of oxidized iron and 25 percent fine prominent light brownish gray (10YR 6/2), moist, iron depletions; abrupt smooth boundary.

Btx_1 – 66-84 cm; brown (10YR 5/3) silt loam; moderate very coarse prismatic parting to moderate medium subangular blocky structure; very firm; brittle; 25 percent continuous distinct dark yellowish brown (10YR 4/4), moist, clay films on all faces of peds; 1 percent weakly cemented iron-manganese concretions and 10 percent fine prominent strong brown (7.5YR 5/6), moist, masses of oxidized iron and 20 percent medium distinct light brownish gray (10YR 6/2), moist, iron depletions; clear wavy boundary.

Btx_2 – 84-150 cm; dark yellowish brown (10YR 4/4), silt loam; moderate very coarse prismatic structure; very firm; brittle; 30 percent continuous distinct yellowish brown (10YR 5/6), moist, clay films on all faces of peds; 1 percent manganese masses and 20 percent medium prominent strong brown (7.5YR 5/6), moist, masses of oxidized iron and 25 percent medium distinct black (10YR 2/1), moist, iron depletions; clear wavy boundary .

Btx_3 – 150-196 cm; yellowish brown (10YR 5/4) silt loam; moderate very coarse prismatic structure; very firm; brittle; 20 percent continuous distinct yellowish brown (10YR 5/8), moist, clay films on all faces of peds; 1 percent weakly cemented iron-manganese concretions and 20 percent coarse prominent strong brown (7.5YR 5/6), moist, masses of oxidized iron and 25 percent coarse distinct light brownish gray (10YR 6/2), moist, iron depletions; gradual wavy boundary.

Btx_4 – 196-226 cm; dark yellowish brown (10YR 4/4) silt loam; weak very coarse prismatic parting to strong medium subangular blocky structure; very firm; brittle; 10 percent continuous distinct yellowish brown (10YR 5/6), moist, clay films on all faces of peds; 1 percent black (10YR 2/1), moist, manganese masses and 20 percent coarse prominent strong brown (7.5YR 5/6), moist, masses of oxidized iron and 20 percent coarse distinct gray (10YR 6/1), moist, iron depletions; clear wavy boundary.

BC – 226-250 cm; brown (10YR 4/3) silt loam; moderate medium subangular blocky structure; firm; brittle; 25 percent coarse distinct gray (10YR 6/1), moist, iron depletions.

Hosmer silt loam; 06KY-101-01

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-25	**Ap**	1.2	1.2	1.2	1.4	2.1	7.1	80.8	12.1	SIL/SI
25-50	**Bt_1**	1.2	1.2	0.8	0.7	1.6	5.5	73.5	21.0	SIL
50-66	**Bt_2**	0.6	1.4	1.1	0.7	1.8	5.6	72.7	21.7	SIL
66-84	**Btx_1**	1.3	1.4	1.0	0.7	2.1	6.5	71.7	21.8	SIL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL –silty clay loam, SIC – silty clay, CL – clay loam.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Btx_2	4.5		1.9	3.5	0.1	0.1	5.6	9.2	7.2	61			
Btx_3	4.6		1.5	3.6	0.1	0.1	5.3	8.6	7.2	62			

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 89KY-057-013
Soil Name As Correlated: Huntington, silt loam
Classification: Fine-silty, mixed, active, mesic Fluventic Hapludolls

Description Date: 5/11/1989 **Describers:** R. Livingston, A.D. Karathanasis, J. Robbins, Jr., L. Norfleet, P. Gregory, and B. Macneal
Location Description: Cumberland Co, KY; Lat/Long: 36°50’20” north, 85°20’36” west.

Landscape Position: Flood plain
Slope: 1 percent
Drainage: Well drained
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Tall fescue (*Lolium arundinaceum*)
Parent Materials: Alluvium

Ap --- 0-19 cm; brown (10YR 4/3) moist, silt loam; moderate fine subangular blocky and moderate coarse granular structure; friable; many fine roots; clear wavy boundary.

Bw$_1$ --- 19-44 cm; dark brown (10YR 3/3) moist, silt loam; moderate medium prismatic parting to moderate medium subangular blocky, and weak medium prismatic parting to moderate medium subangular blocky structure; friable; common fine roots; clear wavy boundary.

Bw$_2$ --- 44-77 cm; dark brown (10YR 3/3) moist and dark yellowish brown (10YR 4/4) moist, silty clay loam; moderate coarse prismatic parting to moderate medium subangular blocky, and moderate medium prismatic parting to moderate medium subangular blocky structure; friable; moderately few fine roots; ped exteriors are (10YR 3/3) and interiors are (10YR 4/4); gradual wavy boundary.

Bw$_3$ --- 77-121 cm; dark yellowish brown (10YR 4/4) moist, silty clay loam; weak coarse prismatic parting to moderate coarse subangular blocky, and weak coarse prismatic parting to moderate medium subangular blocky structure; firm; very few fine roots; clear smooth boundary.

BC --- 121-161 cm; dark yellowish brown (10YR 4/6) moist, silt loam; 1 percent medium distinct brown (10YR 4/3) mottles; weak medium angular blocky, weak coarse angular blocky, weak medium subangular blocky, and weak coarse subangular blocky structure; firm; very few fine roots; gradual wavy boundary.

CB --- 161-180 cm; dark yellowish brown (10YR 4/6) moist, silt loam; 15 percent medium distinct brown (10YR 5/3) mottles; weak coarse subangular blocky and massive structure; firm.

Huntington silt loam; 89KY-057-013

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-19	**Ap**	0.9	1.3	1.4	7.0	13.2	23.8	57.1	19.1	SIL
19-44	**Bw_1**	0.1	0.3	0.5	3.5	8.3	12.7	59	28.3	SICL
44-77	**Bw_2**	0.1	0.2	0.2	3.0	9.1	12.7	55.5	31.8	SICL
77-121	**Bw_3**	0.1	0.1	0.1	1.2	7.7	9.2	56.0	34.8	SICL
121-161	**BC**	0.1	0.1	0.1	2.2	14.7	17.2	53.6	29.2	SICL
161-180	**CB**	0.1	0.1	0.1	1.6	13.8	15.7	58.9	25.4	SIL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL –silty clay loam.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	5.9		6.5	0.5	0.1	0.3	7.4	10.9	4.2	68	0.1	4.6	21
Bw_1	6.5		7.8	0.8	0.1	0.9	9.6	12.2	5.7	79	0.1	2.6	6
Bw_2	6.3		6.6	1.0	0.1	0.5	8.2	10.5	9.2	78	0.2	2.5	4
Bw_3	5.9		4.8	1.1	0.1	0.6	6.6	9.6	9.6	69	0.2	1.7	6
BC	5.5		3.4	0.9	0.1	0.6	5.0	8.7	9.3	57	0.2	1.0	6
CB	5.5		2.7	0.7	0.1	0.7	4.2	7.5	9.2	56	0.5	0.6	9

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID:
Soil Name As Correlated: Latham, silt loam
Classification: Fine, mixed, semiactive, mesic Aquic Hapludults

Description Date: **Describer:** A. D. Karathanasis and T. Sobecki
Location Description: Fleming County, KY; near Wallingford;
Latitude: 38°25'15" N; Longitude: 83°36'45"W

Landscape Position: Upland, ridgetop
Slope: 3 percent
Drainage:
Primary Earth Cover: Tree cover
Existing Vegetation: Oak and hickory
Parent Materials: Loess over Borden Formation sandstone and shale residuum.

Ap – 0 -13 cm; dark brown (10YR 3/3) silt loam; weak fine granular structure parting to weak medium subangular blocky; very friable; clear smooth boundary.

BA – 13-23 cm; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; 2 % by volume sandstone fragments; clear smooth boundary.

Bt – 23-43 cm; strong brown (7.5YR 5/6) silty clay; moderate medium subangular blocky structure; firm; common fine distinct pale olive (5Y 6/3) mottles; 5% by volume sandstone fragments; clear smooth boundary.

2BCt –43-90 cm; yellowish red (5YR 5/8) and strong brown (7.5YR 5/8) silty clay; moderate medium angular blocky structure parting to moderate medium platy structure; firm; common medium distinct pinkish gray (5YR 6/2) mottles; 60% by volume sandstone fragments; clear smooth boundary.

2R – 90-100+ cm; weathered bedrock; massive, structureless.

Latham silt loam

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-13	**A**						3.7	74.1	22.2	SIL
13-23	**BA**						3.4	69.9	26.7	SIL/SICL
23-43	**Bt**						2.6	56.8	40.6	SIC/SICL
43-90	**2BCt**						4.7	44.4	50.9	SIC

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
A	4.1		3.2	0.6	0.2	0	4.0	20.6	16.6	19			
BA	4.4		1.6	0.8	0.1	0	2.5	13.5	11.0	18			
Bt	4.4		1.4	1.7	0.2	0	3.3	18.9	15.6	17			
2BCt	4.5		1.1	4.9	0.3	0.1	6.4	26.0	19.6	25			

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Clay Mineralogy

Horizon	Clay Mineral Content (%)										
	SM	V	V/HIV	CL	INT	K	MI	Q	GI	GO	F
Bt			15			36	40	7			2
2BCt			21			31	41	4			3

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; GO = goethite; GI = gibbsite; F = feldspars.

Pedon ID: 79KY-173-05
Soil Name As Correlated: Lenberg, silt loam
Classification: Fine, mixed, semiactive, mesic Ultic Hapludalfs

Description Date: 06/19/1979 **Describer:** Glenn E. Kelley
Location Description: Montgomery Co, KY; 2900 feet northeast of Big Round Mountain; about 730 feet west of Ky Hwy. 599; about 2.13 miles south of Jeffersonville; Means Geologic Quadrangle; North system: east-west 2,116,000 feet, north-south 162,850 feet.

Landscape Position: Upland, upper slope
Slope: 10 percent
Drainage:
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Bluegrass pasture
Parent Materials: Acid greenish gray shale and siltstone

Ap – 0-8 cm; brown (10YR 5/3) silt loam; weak fine granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

Bt$_1$ – 8-20 cm; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; thin patchy brown (7.5YR 5/4) clay films; 5% siltstone fragments; strongly acid; clear smooth boundary.

Bt$_2$ – 20-36 cm; strong brown (7.5YR 5/6) silty clay; moderate medium subangular blocky structure; firm; common fine roots; thin continuous brown (7.5YR 5/4) clay films; 5% siltstone fragments; strongly acid; clear smooth boundary.

Bt$_3$ – 36-64 cm; yellowish red (5YR 4/6) silty clay; many medium prominent light olive gray mottles; moderate medium and coarse subangular blocky structure; firm; common fine roots; thin patchy brown (7.5YR 5/4) clay films; 10% siltstone fragments; medium acid; clear smooth boundary.

C – 64-94 cm; reddish brown (5YR 4/3) siltstone and silty shale, with red and gray silty clay fines between stones; massive, few fine roots; medium acid; gradual smooth boundary.

Cr – 94 cm; rippable siltstone and shale.

Lenberg silt loam; 79KY-173-05

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-8	**Ap**	0.2	0.5	0.5	0.9	1.6	3.7	76.1	20.2	SIL
8-20	**Bt_1**	0.1	0.4	0.3	0.6	1.0	2.4	70.6	27.0	SICL/SIL
20-36	**Bt_2**	0.1	0.2	0.2	0.5	1.0	2.0	62.3	35.7	SICL
36-64	**Bt_3**	0.0	0.1	0.1	0.2	0.4	0.8	53.7	45.5	SIC
64-94	**C**	0.2	0.3	0.2	0.5	2.3	3.5	64.4	32.1	SICL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	5.3	4.6	7.8	1.1	0.4	0.1	9.4	13.5	12.1	70	0.4	4.9	5
Bt_1	5.1	3.7	2.6	0.8	0.2	0.1	3.7	10.7	5.6	35	0.1	1.9	1.5
Bt_2	4.8	3.6	1.5	1.4	0.3	0.1	3.3	12.1	12.1	27	0.1	0.8	1.5
Bt_3	4.6	3.5	0.9	2.8	0.3	0.1	4.1	13.3	9.0	31	0.1	0.6	0.5
C	4.7	3.5	0.3	5.0	0.4	0.1	5.8	11.3	6.5	51	0.1	0.5	1

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Clay Mineralogy

Horizon	Clay Mineral Content (%)										
	SM	V	V/HIV	CL	INT	K	MI	Q	GI	GO	F
Bt_1			18		5	27	45	5			
Bt_2			20		2	25	51	2			
Bt_3			15		6	22	55	2			

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; GO = goethite; GI = gibbsite; F = feldspars.

Pedon ID: 66KY-105-06
Soil Name As Correlated: Loring, silt loam
Classification: Fine-silty, mixed, active, thermic Oxyaquic Fragiudalfs

Description Date: 11/09/1966 **Describers:** Frank Anderson and H. H. Bailey
Location Description Hickman County, KY; Byron Bodkin farm; about 100 feet west of Ky Hwy 123, about 600 feet south of Carlisle County line.

Landscape Position: Upland, ridgetop
Slope: 4 percent
Drainage: Well to moderately well drained
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Pasture**,** fescue and clover
Parent Materials: Loess

Ap—0 -18 cm; dark brown (7.5YR 3/3) silt loam; weak fine granular structure; very friable; pH 6; abrupt smooth boundary.

Bt$_1$ – 18-48 cm; brown (7.5YR 4/4) light silty clay loam; moderate fine subangular blocky structure; friable; thin discontinuous clay films; black films cover about 1% of ped faces; pH 6.3.

Bt$_2$ –48-69 cm; brown (7.5YR 4/4) light silty clay loam with common medium distinct mottles of light brownish gray (10YR 6/2) and brown (10YR 5/3); moderate medium subangular blocky structure; firm; nearly continuous clay films; black films cover 1% of ped surfaces; black concretionary masses 3 mm in diameter; pH 5.3; clear wavy boundary.

Btx$_1$ – 69-100 cm; mottled brown (7.5YR 4/4) and light brownish gray (10YR 6/2) light silty clay loam; moderate medium and very coarse prismatic and weak fine subangular blocky structure; firm, brittle; continuous clay films some 0.5 mm thick on vertical faces; 1 to 2% black films on peds; small black concretionary masses less than 5 mm in diameter; silt coatings mostly greater than 3 mm thick in vertical cracks between peds, about 2% by volume; pH 5.3.

Btx$_2$ – 100-147 cm; brown (7.5YR 4/4) heavy silt loam with many medium distinct mottles of light brownish gray (10YR 6/2); weak very coarse prismatic structure; firm; continuous clay films; less than 1% black films and black concretionary material; silt coatings mostly greater than 3 mm thick in vertical cracks between peds, about 2% by volume; pH 5.2

C – 147-178 cm; brown (7.5YR 4/4) silt loam with common medium distinct mottles of light gray (10YR 7/2); moderate coarse and very coarse prismatic structure; friable; light gray (10YR 7/2) silt coats on large prism faces; roots in gray silt areas, pores and cavities, less than 1 mm in diameter and about 5 mm apart; pH 5.2

Loring silt loam; 66KY-105-06

Particle Size Analysis

Depth (cm)	Horizon	Sand Fractions (%) VCS	CS	MS	FS	VFS	Total (%) Sand	Silt	Clay	Textural Class
0-18	**Ap**	0.0	0.0	0.0	0.2	1.9	2.1	83.6	14.3	SIL
18-48	**Bt_1**	0.0	0.0	0.0	0.1	1.7	1.8	75.9	22.3	SIL
48-69	**Bt_2**	0.0	0.0	0.0	0.1	1.7	1.8	72.1	26.1	SIL/SICL
69-100	**Btx_1**	0.0	0.1	0.1	0.1	1.7	2.0	73.1	24.9	SIL
100-147	**Btx_2**	0.0	0.0	0.0	0.1	1.6	1.7	78.5	19.8	SIL
147-178	**C**	0.0	0.0	0.0	0.1	1.3	1.4	79.5	19.1	SIL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH 1:1 Water	1:1 KCl	Exchangeable Bases (meq/100 g) Ca	Mg	K	Na	Sum of Bases (meq/ 100 g)	CEC (meq/ 100 g)	Ext. Acid. (meq/ 100 g)	Base Sat (%)	$CaCO_3$ Eq. (%)	OM (%)	Bray P (mg/L)
Ap	6.6	5.8	6.3	0.1	0.2	0.1	6.7	8.5		79	0.2	2.0	24
Bt_1	6.3	4.8	7.8	0.4	0.5	0.1	8.8	15.1		58	0.3	0.6	37
Bt_2	5.3	4.1	7.9	0.6	0.6	0.1	9.2	17.0		54	0.1	0.3	33
Btx_1	5.3	4.0	6.7	0.5	0.5	0.1	7.8	16.2		48	0.2	0.2	36
Btx_2	5.2	4.1	6.2	0.5	0.4	0.1	7.2	13.9		52	0.1	0.1	37
C	5.2	4.1	5.8	0.4	0.3	0.1	6.6	13.5		49	0.2	0.1	32

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Mineralogy

Horizon	Silt Mineral Content (%) Q	I	F	CL	K	Clay Mineral Content (%) SM	HIV	K	I	Q
Bt_1	45	20	15	10	10	50	25	15	10	
Bt_2	55	20	15	5	5	65	20	15	10	
Btx_1	50	20	15	10	5	50	15	20	10	5

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; I = illite; F = feldspars.

Pedon ID: 10KY-067-001
Soil Name As Correlated: Lowell silt loam
Classification: Fine, mixed, active, mesic Typic Hapludalfs

Description Date: 1/31/2012 **Describers:** Bob Eigel and Scott Aldridge
Location Description: Fayette Co, KY; in a pasture field 725 yards NW of the intersection of Briar Hill Road and Muir Station Road

Landscape Position: Upland, ridge
Slope: 3 percent
Drainage: Well drained
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Pasture; clover, orchardgrass, and fescue
Parent Materials: Residuum from Lexington limestone

Ap – 0-28 cm; brown (10YR 4/3) silt loam; moderate medium granular structure; very friable; abrupt smooth boundary.

Bt_1 – 28-40 cm; strong brown (7.5YR 4/6) light silty clay loam; moderate medium subangular blocky structure; friable; clear smooth boundary.

Bt_2 – 40-70 cm; strong brown (7.5YR 4/6) heavy silty clay loam; moderate medium subangular blocky structure; firm; clear smooth boundary.

Bt_3 – 70-85 cm; strong brown (7.5YR 5/8) silty clay; very firm; clear smooth boundary.

Bt_4 – 85-160 cm; yellowish brown (10YR 5/6) silty clay; very firm; 8 percent iron-manganese masses; clear smooth boundary.

BC – 160-200 cm; strong brown (7.5YR 5/6), yellowish brown (10YR 5/6), and 10% light yellowish brown (2.5Y 6/3) clay; very firm; 10 percent iron-manganese masses; clear smooth boundary.

C – 200-250 cm; light yellowish brown (2.5Y 6/3) and 5 percent brownish yellow (10YR 6/6) gravelly clay; very firm; 25 percent gravel.

Lowell silt loam; 10KY-067-001

Particle Size Analysis

Depth (cm)	Horizon	VCS	CS	MS	FS	VFS	Sand	Silt	Clay	Textural Class
		Sand Fractions (%)					Total (%)			
0-28	**Ap**	2.0	3.8	3.0	1.5	1.0	11.3	72.2	16.5	SIL
28-40	**Bt_1**	1.4	2.4	1.7	0.7	0.5	6.7	62.2	31.1	SICL
40-70	**Bt_2**	0.4	1.8	1.5	0.8	0.5	5.0	55.9	39.1	SICL/SIC
70-85	**Bt_3**	0.3	0.3	0.5	0.7	0.6	2.4	38.5	59.1	C/SIC
85-160	**Bt_4**	0.0	0.2	0.4	1.0	1.3	2.9	39.8	57.3	SIC/C
160-200	**BC**	0.2	0.4	0.7	1.5	1.5	4.3	50.3	45.4	SIC
200-250	**C**	4.4	5.7	7.3	6.0	2.5	25.9	44.1	30.0	CL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand;
SIL – silt loam, SICL – silty clay loam; SIC – silty clay. C - clay, CL – clay loam.

Chemical Properties

Horizon	pH 1:1 Water	pH 1:1 KCl	Exchangeable Bases (meq/100 g) Ca	Mg	K	Na	Sum of Bases (meq/ 100 g)	CEC (meq/ 100 g)	Ext. Acid. (meq/ 100 g)	Base Sat (%)	$CaCO_3$ Eq. (%)	OM (%)	Bray P (mg/L)
Ap		5.3	9.3	1.4	0.3	0.1	11.1	14.9	10.3	74			20.5
Bt_1		5.0	11.3	1.6	0.2	0.1	13.2	17.2	9.1	77			0.5
Bt_2		4.9	15.5	1.6	0.2	0.1	17.4	23.7	10.2	74			0.5
Bt_3		3.7	22.3	2.0	0.2	0.1	24.6	38.0	16.4	65			0.5
Bt_4		5.3	35.8	1.5	0.2	0.1	37.5	31.6	7.7	100+			1
BC		6.0	30.4	1.2	0.2	0.1	31.9	24.8	4.7	100+			0.5
C		7.1	17.8	1.3	0.1	0.1	19.2	9.3	0.9	100+			0

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 65KY-125-27
Soil Name As Correlated: Marrowbone, sandy loam
Classification: Coarse-loamy, mixed, semiactive, mesic Typic Dystrudepts

Description Date: 11/10/1965 **Describers:**
Location Description: Laurel Co, KY; 2 miles south of Ky Hwy 80 on Ky Hwy 1226.

Landscape Position: Upland
Slope: 7 percent
Drainage:
Primary Earth Cover: Forest
Existing Vegetation: White oak, hickories, and Virginia pine
Parent Materials: Residuum

Oi—5-1 cm; hardwood leaves and twigs.

Oe – 1-0 cm; partially decomposed leaves and twigs.

A_1 – 0 - 5 cm; dark brown (10YR 3/3) sandy loam; weak fine granular structure; loose; 1 percent, by volume, channers; many roots; very strongly acid; abrupt smooth boundary.

A_2— 5-13 cm; yellowish brown (10YR 5/4) sandy loam; weak medium granular structure; very friable; 2 percent, by volume, channers; many roots; very strongly acid; clear smooth boundary.

Bw_1 – 13-28 cm; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; very friable; 2 percent, by volume, channers; common roots; very strongly acid; clear smooth boundary.

Bw_2 – 28-48 cm; yellowish brown (10YR 5/8) sandy loam; weak fine and medium subangular blocky structure; very friable; 3 percent, by volume, channers; common roots; very strongly acid; clear wavy boundary.

BC – 48 - 64 cm; reddish yellow (7.5YR 6/6) loamy sand; weak very fine subangular blocky structure to single grain; very friable; 3 percent, by volume, channers; few roots; very strongly acid; gradual irregular boundary.

C – 64-90 cm; yellowish red (5YR 5/6) sand; single grain; brittle; 30 percent, by volume, soft channers; few roots; very strongly acid; abrupt smooth boundary.

R – 90 cm; sandstone rock.

Marrowbone sandy loam; 65KY-125-27

Particle Size Analysis

Depth (cm)	Horizon	Sand Fractions (%) VCS	CS	MS	FS	VFS	Total (%) Sand	Silt	Clay	Textural Class
0-5	**A_1**	0.1	4.1	40.6	23.9	3.8	72.5	20.7	6.8	SL
5-13	**A_2**	0.1	4.2	39.5	23.8	3.9	71.5	21.4	7.1	SL
13-28	**Bw_1**	0.1	4.0	36.9	24.0	4.2	69.2	24.6	6.2	SL
28-48	**Bw_2**	0.1	4.4	39.3	20.8	3.5	68.1	26.0	5.9	SL
48-64	**BC**	0.1	8.0	52.3	24.1	3.6	88.1	8.5	3.4	S/LS
64-90	**C**	0.1	9.6	52.8	17.3	3.6	83.4	8.4	8.2	LS

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH 1:1 Water	pH 1:1 KCl	Exchangeable Bases (meq/100 g) Ca	Mg	K	Na	Sum of Bases (meq/100 g)	CEC (meq/100 g)	Ext. Acid. (meq/100 g)	Base Sat (%)	$CaCO_3$ Eq. (%)	OM (%)	Bray P (mg/L)
A_1	4.3	3.5	0.7	0.1	0.2	0.1	1.1	8.8		12	0.2	5.2	16.1
A_2	4.8	4.2	0.1	0.1	0.1	0.1	0.4	4.1		10	0.2	1.8	10.5
Bw_1	4.8	4.3	0.1	0.1	0.1	0.1	0.4	3.9		10	0.1	0.7	7.0
Bw_2	4.2	4.2	0.2	0.1	0.1	0.1	0.5	2.3		22	0.1	0.3	4.0
BC	4.8	4.2	0.1	0.1	0.1	0.1	0.4	1.4		29	0.2	0.1	3.5
C	4.9	3.9	0.2	0.1	0.1	0.1	0.5	3.7		13	0.2	0.1	3.5

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 08KY-067-08
Soil Name As Correlated: McAfee, silt loam
Classification: Fine, mixed, active, mesic Mollic Hapludalfs

Description Date: 09/18/2008 **Describers:** Steve Blanford and Bob Eigel
Location Description: Fayette County, KY; in a hay field on a farm adjacent to the Raven Run Nature Preserve (Northern Tract) 650 feet south/southeast of barn, 0.5 miles west of Cedar Creek Lane, 3.25 miles south/southwest of Athens; USGS Coletown, Kentucky topographic quadrangle.

Landscape Position: On backslope of side slope of karst ridge on upland
Slope: 15 percent
Drainage: Well drained
Primary Earth Cover: Grass/herbaceous cover;
Parent Materials: Clayey residuum weathered from phosphatic limestone

Ap—0-18 cm; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) crushed, dry; weak medium subangular blocky structure parting to moderate fine granular structure; friable; nonsticky, nonplastic; many fine roots throughout; 1 percent flat angular indurated 2- to 150-mm chert fragments; pH 6.5 (pH meter, 1:1 water); abrupt smooth boundary.

Bt_1 – 18-46 cm; reddish brown (5YR 4/3) silty clay; strong medium angular blocky structure; firm; moderately sticky, moderately plastic; common fine roots between peds; 50 percent continuous distinct clay films on vertical faces of peds; 1 percent fine prominent cylindrical moderately cemented iron-manganese nodules; 5 percent flat angular indurated 2- to 150-mm chert fragments; pH 6.9; clear smooth boundary.

Bt_2 – 46-81 cm; dark reddish brown (5YR 3/3) silty clay; strong coarse angular blocky structure and strong medium angular blocky structure; firm; moderately sticky, very plastic; few fine roots between peds; 70 percent continuous distinct clay films on vertical faces of peds; 2 percent fine prominent cylindrical moderately cemented iron-manganese nodules; 10 percent flat angular indurated 2- to 150-mm chert fragments; pH 6.9; abrupt irregular boundary.

R – 81- 91 cm; limestone bedrock.

McAfee silt loam; 08KY-067-08

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-18	**Ap**	3.1	5.2	3.8	2.7	2.0	16.8	65.1	18.1	SIL
18-46	**Bt_1**	1.7	2.0	1.9	1.6	1.2	8.4	58.1	33.5	SICL
46-81	**Bt_2**	1.0	1.9	1.5	1.5	1.1	7.0	49.2	43.8	SIC

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	6.5		8.8	2.7	0.3	0.1	11.8	22.7	11.5	52	0.3	4.4	161
Bt_1	6.9		9.3	1.4	0.2	0.1	10.9	20.8	8.8	52	0.1	1.0	199
Bt_2	6.9		14.7	0.8	0.3	0.1	15.9	27.9	9.4	57	0.2	1.1	174

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Clay Mineralogy

Horizon	Clay Mineral Content (%)										
	SM	V	V/HIV	CL	INT	K	MI	Q	GI	GO	F
Bt_1	20		30		8	20	10	7			5
Bt_2	30		25		10	15	10	5			5

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; GO = goethite; GI = gibbsite; F = feldspars.

Pedon ID: 66KY-105-02
Soil Name As Correlated: Memphis, silt loam
Classification: Fine-silty, mixed, active, thermic Typic Hapludalfs

Description Date: 11/07/1966 **Describers:** Frank Anderson and H. H. Bailey
Location Description Hickman County, KY; about 1 mile west of the northern junction of Highways 808 and 123.

Landscape Position: Upland, ridgetop
Slope: 4 percent
Drainage: Well drained
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Pasture**:** clover, Bermuda grass, weeds
Parent Materials: Loess

Ap—0 -20 cm; brown (10YR 4/3) silt loam; weak medium granular structure; very friable; pH 5.6; abrupt smooth boundary.

Bt_1 – 20-53 cm; brown (7.5YR 4/4) light silty clay loam; moderate fine and medium subangular blocky structure; friable; thin continuous clay films; worm casts, less than1% by volume; pH 5.9; gradual wavy boundary.

Bt_2 –53-84 cm; brown (7.5YR 4/4) light silty clay loam with few fine faint mottles of yellowish brown (10YR 5/4); moderate medium and coarse subangular blocky structure; firm; few very thin grayish silt coatings on vertical faces of larger peds, less than 1% by volume; thin continuous clay films; pH 6.1

Bt_3– 84-125 cm; brown (7.5YR 4/4) heavy silt loam with few fine faint mottles of yellowish brown (10YR 5/4); moderate very coarse prismatic and moderate medium and coarse subangular blocky structure; firm; penetration of fine roots along vertical ped faces; few black specks, less than 1% by volume; thin continuous clay films; pH 5.9.

BC – 125-140 cm; brown (7.5YR 4/4) heavy silt loam; weak very coarse prismatic and medium subangular blocky structure; firm; thin discontinuous clay films; pores less than 1 mm diameter about 1.3 cm apart; pH 6.2; diffuse wavy boundary.

C – 140-170 cm; brown (7.5YR 4/4) silt loam; weak very coarse prismatic structure; friable; few discontinuous clay films on most vertical ped faces; pH 6.1.

Memphis silt loam; 66KY-105-0622

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-20	**Ap**	0.0	0.0	0.0	1.5	2.5	4.0	85.5	10.5	SI/SIL
20-53	**Bt_1**	0.0	0.0	0.0	0.1	1.6	1.7	71.4	26.9	SIL/SICL
53-84	**Bt_2**	0.0	0.0	0.0	0.0	1.8	1.8	74.5	23.7	SIL
84-125	**Bt_3**	0.0	0.0	0.0	0.1	1.8	1.9	75.5	22.6	SIL
125-140	**BC**	0.1	0.0	0.0	0.0	1.5	1.6	79.9	18.5	SIL
140-170	**C**	0.0	0.0	0.0	0.0	1.4	1.4	80.3	18.3	SIL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	5.6	4.5	4.0	0.1	0.2	0.1	4.4	7.3		60	0.2	1.3	15
Bt_1	5.9	4.7	10.1	0.2	0.4	0.1	10.8	16.1		67	0.1	0.4	72
Bt_2	6.1	4.9	12.5	0.2	0.4	0.1	13.2	16.4		80	0.1	0.3	84
Bt_3	5.9	5.1	9.5	0.3	0.5	0.1	10.4	15.7		66	0.1	0.1	77
BC	6.2	4.8	8.9	0.3	0.5	0.1	9.8	13.6		72	0.2	0.1	72
C	6.1	4.7	8.3	0.3	0.4	0.1	9.1	14.0		65	0.1	0.1	54

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Mineralogy

Horizon	Silt Mineral Content (%)					Clay Mineral Content (%)				
	Q	I	F	V	K	SM	HIV	K	I	Q
Bt_1	55	15	20	5	5	30	10	30	30	
Bt_2	60	15	20		5	45		20	30	5
Bt_3	45	25	20		10	50	10	15	20	5

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; I = illite; F = feldspars.

Pedon ID: 94KY-135-38
Soil Name As Correlated: Muse, channery silt loam
Classification: Fine, mixed, semiactive, mesic Typic Hapludults

Description Date: 1994 **Describer:** S. Jacobs
Location Description: Lewis County, KY.

Landscape Position: Upland
Slope:
Drainage:
Primary Earth Cover:
Existing Vegetation:
Parent Materials:

A – 0 -10 cm; dark yellowish brown (10YR 3/4) channery silt loam; weak fine granular structure; friable; many fine, common medium, and few coarse roots; 15% sandstone fragments; slightly acid; clear smooth boundary.

Bt_1 – 10-38 cm; yellowish brown (10YR 5/6) silty clay; moderate fine and medium subangular blocky structure; firm; common fine and medium, and few coarse roots; 3% sandstone and 10% shale fragments; many faint and distinct clay films on peds; very strongly acid; gradual smooth boundary.

Bt_2 –38-66 cm; yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) channery clay; common fine prominent light yellowish brown (2.5Y 6/3) mottles; moderate fine and medium subangular blocky structure; very firm; few fine and medium; 5% sandstone and 10% shale fragments; many distinct clay films on peds; very strongly acid; gradual wavy boundary.

Bt_3 – 66-117 cm; brownish yellow (10YR 6/6) channery clay; moderate medium and coarse subangular blocky structure; very firm; few fine roots; 8% sandstone and10% shale fragments; many faint clay films on peds; very strongly acid.

Muse channery silt loam; 94KY-135-38

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-10	**A**	5.1	6.6	3.7	2.9	4.3	22.6	66.6	10.8	SIL
10-38	**Bt_1**	1.4	1.7	1.0	0.7	1.2	6.0	56.9	37.1	SICL
38-66	**Bt_2**	3.3	2.9	1.6	0.8	0.9	9.5	49.6	40.9	SIC/SICL
66-117	**Bt_3**	3.2	2.1	1.2	0.9	1.8	9.2	52.2	38.6	SIC/SICL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
A													
Bt_1													
Bt_2													
Bt_3													

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Clay Mineralogy

Horizon	Clay Mineral Content (%)										
	SM	V	V/HIV	CL	INT	K	MI	Q	GI	GO	F
Bt_1		10			10	20	54	6			
Bt_2					5	20	68	7			

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; GO = goethite; GI = gibbsite; F = feldspars.

Pedon ID: 98KY-015-UK5
Soil Name As Correlated: Nicholson, silt loam
Classification: Fine-silty, mixed, active, mesic Oxyaquic Fragiudalfs

Description Date: 7/17/1998 **Describer:** A. D. Karathanasis
Location Description: Boone Co, KY; Davis farm.

Landscape Position: Upland, summit
Slope: 2 percent
Drainage: Moderately well drained
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation:
Parent Materials: Limestone Residuum
Restrictions: Fragipan: 48 centimeters

Ap --- 0-19 cm; dark yellowish brown (10YR 4/4) moist, silt loam; weak granular structure; friable; abrupt smooth boundary.

Bt_1 --- 19-34 cm; dark yellowish brown (10YR 4/6) moist, silty clay loam; weak subangular blocky structure; firm; gradual wavy boundary.

Bt_2 --- 34-48 cm; dark yellowish brown (10YR 4/6) moist, silty clay loam; 1 percent strong brown (7.5YR 5/6) mottles; moderate subangular blocky structure; firm; gradual wavy boundary.

Btx_1 --- 48-65 cm; yellowish brown (10YR 5/4) moist, silty clay loam; weak prismatic parting to angular blocky structure; very firm; 10 percent (common) manganese masses; few light brownish gray (10YR 6/2) depletions; gradual wavy boundary.

Btx_2 --- 65-91 cm; yellowish brown (10YR 5/6) moist, silty clay loam; 1 percent dark yellowish brown (10YR 4/4) mottles; weak prismatic parting to angular blocky structure; very firm; 10 percent (common) manganese masses; few light gray (10YR 7/1) depletions; gradual wavy boundary.

2Bt --- 91+ cm; yellowish brown (10YR 5/6) moist, clay; 1 percent pale brown (10YR 6/3) mottles; moderate angular blocky structure; firm; 10 percent (common) manganese masses; few reddish gray (2.5YR 6/1) depletions.

Nicholson silt loam; 98KY-015-UK5

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-19	**Ap**	0.4	1.6	1.7	1.4	1.4	6.5	70.7	22.8	SIL
19-34	**Bt_1**	0.2	0.9	1.0	0.9	1.4	4.4	67.8	27.8	SICL
34-48	**Bt_2**	0.2	1.3	1.1	0.8	1.6	5.0	66.0	29.0	SICL
48-65	**Btx_1**	0.9	2.2	1.9	1.1	1.2	9.3	62.9	29.8	SICL
65-91	**Btx_2**	1.8	2.7	2.4	1.7	1.5	10.1	54.8	35.1	SICL
91+	**2Bt**	0.2	0.5	0.7	1.8	1.4	4.6	37.3	58.1	C

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL = silty clay loam, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	5.9		6.1	1.2	0.6	0.1	8.0	13.2	7.8	61	0.4	1.7	72
Bt_1	6.2		8.6	1.7	0.2	0.1	10.6	14.0	5.9	76	0.6	0.6	5
Bt_2	5.5		7.9	1.7	0.2	0.1	9.9	16.2	10.3	61	0.2	0.4	5
Btx_1	5.0		6.3	1.7	0.2	0.1	8.3	17.6	15.0	47	0.1	0.4	7
Btx_2	4.9		8.2	2.1	0.2	0.1	10.6	23.5	15.0	45	0.1	0.3	5
2Bt	6.6		32.6	6.3	0.2	0.6	39.7	32.3	6.6	100	0.1	0.3	48

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Clay Mineralogy

Horizon	Clay Mineral Content (%)										
	SM	V	V/HIV	CL	INT	K	MI	Q	GI	GO	F
Btx_1		75				13	8	4			
2Bt		88				4	2	3			3

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; GO = goethite; GI = gibbsite; F = feldspars.

Pedon ID: 71KY-093-04
Soil Name As Correlated: Nolin, silt loam
Classification: Fine-silty, mixed, active, mesic Dystric Fluventic Eutrudepts

Description Date: **Describers:**
Location Description: Hardin Co, KY; 1000 feet east of I-65, 0.5 mile south of the intersection with U. S. Hwy 62, 2 miles east of Elizabethtown.

Landscape Position: Floodplain
Slope: 1 percent
Drainage:
Primary Earth Cover:
Parent Materials: Alluvium derived mostly from soils of limestone and loess origin.

Ap – 0-15 cm; brown (10YR 4/3) silt loam; moderate medium granular and subangular blocky structure; very friable; common fine roots; few small pores; slightly acid; clear smooth boundary.

Bw$_1$ – 15-33 m; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure parting to weak fine granular; very friable; few fine roots; few small pebbles; slightly acid.

Bw$_2$ – 33-51 cm; same as above; horizons were divided for sampling; gradual smooth boundary.

Bw$_3$ -- 51-64 cm; brown (10YR 4/3) silt loam; few fine faint dark yellowish brown (10YR 4/4) and (10YR 3/4) mottles; weak medium subangular blocky structure parting to weak fine and medium granular structure; very friable; few fine roots; slightly acid; clear smooth boundary.

Ab – 64-86 cm; dark yellowish brown (10YR 3/4) silt loam; weak medium subangular blocky structure parting to moderate fine and medium granular structure; very friable; few fine roots; common small pores; slightly acid; clear smooth boundary.

Bwb – 86-107 cm; brown (10YR 4/3) silt loam; few fine faint dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; few small pores; mildly alkaline; abrupt smooth boundary.

2C – 107-132 cm; dark grayish brown (10YR 4/2) very gravelly loam; common medium faint dark yellowish brown (10YR 4/4) mottles; mostly massive with some weak medium subangular blocky structure; friable; 65 percent gravel; neutral; abrupt smooth boundary.

R – 132+ cm; Limestone bedrock.

Nolin silt loam; 71KY-093-04

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-15	**Ap**	0.1	0.5	0.8	2.3	2.6	6.3	72.9	20.8	SIL
15-33	**Bw_1**	0.4	0.9	1.5	4.3	4.7	11.8	71.4	16.8	SIL
33-51	**Bw_2**	0.3	0.6	1.2	3.8	4.4	10.3	75.8	13.9	SIL
51-64	**Bw_3**	0.1	0.6	0.9	3.4	4.3	9.3	76.2	14.5	SIL
64-86	**Ab**	0.5	1.5	2.6	8.6	8.6	21.8	59.3	18.9	SIL
86-107	**Bwb**	0.8	2.5	4.0	10.2	8.3	25.8	54.2	20.0	SIL
107-132	**2C**	4.1	6.5	6.6	11.2	6.9	35.3	42.5	22.2	L

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	6.3	5.3	10.5	0.7	0.2	0.1	11.5	10.6		100+	0.3	3.9	
Bw_1	6.4	5.1	4.9	0.2	0.1	0.1	5.3	6.7		79	0.3	1.1	
Bw_2	6.0	4.7	3.3	0.1	0.1	0.1	3.6	6.4		56	0.2	1.2	
Bw_3	6.1	4.8	4.0	0.1	0.1	0.1	4.3	6.8		63	0.1	1.1	
Ab	7.0	5.6	11.1	0.2	0.1	0.1	11.5	9.9		100+	0.1	1.4	
Bwb	7.0	5.9	13.0	0.2	0.1	0.1	13.4	11.4		100+	0.4	1.1	
2C	7.1	6.1	12.1	0.6	0.1	0.1	12.9	11.1		100+			

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Mineralogy

Horizon	Silt Mineral Content (%)				Clay Mineral Content (%)				
	Q	F	MI	K	V	HIV	K	MI	Q
Bw_2	95	5			15	25	25	20	15
Ab	90	5	5			60	20	15	5
Bwb	85	5	10			65	20	10	5

Minerals: V = vermiculite; HIV = hydroxyinterlayered vermiculite; K= kaolinite; MI = mica; Q = quartz; F = feldspars.

Pedon ID: 79KY-213-03
Soil Name As Correlated: Pembroke, silt loam
Classification: Fine-silty, mixed, active, mesic Mollic Paleudalfs

Description Date: 06/11/1979 **Describer:** M. J. Mitchell
Location Description Simpson County, KY; 500 feet east of Mary Adams, 0.6 mile east of the intersection of KY Hwy 73 and James Mill Road, approximately 5 miles northwest of Franklin, KY. Kentucky coordinate grid values: X-1,748,000, Y – 169,000.

Landscape Position: Upland
Slope: 1 percent
Drainage:
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Fescue and red clover
Parent Materials: Limestone

Ap_1—0 -12 cm; dark reddish brown (5YR 3/3) silt loam; weak to moderate fine granular structure; very friable; common fine roots; slightly acid; gradual wavy boundary.

Ap_2—12-28 cm; dark brown (10YR 3/3) silt loam, with intrusion of dark reddish brown (5YR 3/3); weak to moderate fine granular structure; friable; common fine roots; medium acid; abrupt wavy boundary.

Bt_1 – 28-53 cm; reddish brown (5YR 4/4) silt loam; weak fine subangular blocky structure; friable; few fine roots; few rounded black concretions; slightly acid; abrupt smooth boundary.

Bt_2 –53-79 cm; red (2.5YR 4/6) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common clay films; concretionary stains on ped faces; slightly acid; gradual smooth boundary.

Bt_3 – 79-102 cm; dark red (2.5YR 3/6) heavy silty clay loam; moderate medium subangular blocky structure; firm; common clay films; few yellowish brown (10YR 5/6) silt coatings on ped faces; common black concretions and stains; strongly acid; gradual smooth boundary.

Bt_4 – 102-142 cm; dark red (2.5YR 3/6) silty clay; moderate medium subangular blocky structure; firm; common clay films; common black concretionary stains on ped faces; strongly acid; gradual smooth boundary.

Bt_5 – 142-173+ cm; dark red (2.5YR 3/6) silty clay; moderate medium subangular blocky structure; firm; common clay films; few black concretions; reddish brown (5YR 4/4) silt coatings on ped faces; strongly acid.

Pembroke silt loam; 79KY-213-03

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-12	**Ap_1**	0.0	0.1	0.7	4.0	1.8	6.6	66.9	26.5	SIL
12-28	**Ap_2**	0.1	0.2	0.7	5.3	2.2	8.5	71.6	19.9	SIL
28-53	**Bt_1**	0.1	0.2	0.6	3.8	1.8	6.5	61.7	31.8	SICL
53-79	**Bt_2**	0.1	0.2	1.0	6.8	3.2	11.3	52.2	36.5	SICL
79-102	**Bt_3**	0.0	0.1	0.1	7.7	3.6	11.5	49.8	38.7	SICL
102-142	**Bt_4**	0.1	0.1	0.5	7.8	3.7	12.2	46.2	41.6	SIC
142-173+	**Bt_5**	0.0	0.1	1.1	8.6	4.1	13.9	41.8	44.3	SIC

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap_1	5.1	4.7	4.3	1.2	2.1	0.4	8.0	11.4	9.5	70	0.1	2.4	18.5
Ap_2	5.2	4.5	3.3	0.7	1.4	0.4	5.8	7.9	8.1	73	0.1	1.3	3.5
Bt_1	5.5	4.8	5.8	1.6	1.2	0.5	9.1	12.2	7.2	75	0.9	0.5	2
Bt_2	5.1	4.3	6.3	1.3	0.7	0.4	8.7	12.9	8.1	67	0.1	0.3	1
Bt_3	4.8	4.0	5.2	1.4	0.4	0.5	7.5	13.4	8.8	56	0.1	0.2	1
Bt_4	4.5	3.8	4.1	2.1	0.4	0.3	6.9	12.6	9.6	55	0.1	0.2	2
Bt_5	4.6	3.8	3.0	1.8	0.4	0.3	5.5	12.3	10.8	45	0.2	0.2	1

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 10KY-125-FSC-02
Soil Name As Correlated: Shelocta, silt loam
Classification: Fine-loamy, mixed, active, mesic Typic Hapludults

Description Date: 05/25/2010 **Describer:** Harry Evans
Location Description: Laurel County, KY; Daniel Boone National Forest, Holly Bay Area; about 0.10 miles east of KY Hwy 1193 and 0.10 miles north of camping area dump station.

Landscape Position: Upland; side slope of ridge, upper third of shoulder
Slope: 12 percent
Drainage: Well drained
Primary Earth Cover: Trees
Existing Vegetation: Hardwood trees; red maple, northern red oak, yellow poplar, American holly, and New York fern
Parent Materials: Residuum weathered from sandstone and siltstone
Restrictions:

Oi – 3-0 cm (1.2 to 0 inches); slightly decomposed plant material; abrupt smooth boundary.

A$_1$ – 0-3 cm (0 to 1.2 inches); dark brown (10YR 3/3) moist, silt loam; weak fine granular structure; very friable; many fine and common medium roots throughout; very strongly acid, pH 4.5, Hellige-Truog; abrupt smooth boundary.

A$_2$ – 3-13 cm (1.2 to 5.1 inches); dark yellowish brown (10YR 3/4) moist, silt loam; weak medium granular structure; very friable; common medium and fine roots throughout; very strongly acid, pH 5, Hellige-Truog; abrupt smooth boundary.

BA – 13-22 cm (5.1 to 8.7 inches); yellowish brown (10YR 5/4) moist, silt loam; weak medium subangular blocky structure; friable; common medium and fine roots throughout; 5 percent flat subangular indurated 2 to 75 millimeter (0.1 to 3 inches) sandstone fragments; very strongly acid, pH 5, Hellige-Truog; clear smooth boundary.

Bt$_1$ – 22- 66 cm (8.7 to 26 inches); strong brown (7.5YR 5/6) moist, silt loam; moderate medium subangular blocky structure; firm; 15 percent (few) patchy distinct clay films on all faces of peds; 10 percent flat subangular indurated 2 to 75 millimeter (0.1 to 3 inches) sandstone fragments; very strongly acid, pH 4.5, Hellige-Truog; gradual smooth boundary.

Bt$_2$ – 66- 91 cm (26 to 35.8 inches); strong brown (7.5YR 5/6) moist, clay loam; moderate medium subangular blocky structure; firm; 10 percent (few) discontinuous distinct clay films on all faces of peds; 10 percent flat angular indurated 2 to 75 millimeter (0.1 to 3 inches) siltstone fragments; very strongly acid, pH 4.5, Hellige-Truog; gradual smooth boundary.

BC – 91-116 cm (35.8 to 45.7 inches); strong brown (7.5YR 5/6) moist, loam; weak medium subangular blocky structure; very firm; very strongly acid, pH 4.5, Hellige-Truog; abrupt smooth boundary.

Cr – 116-136 cm (45.7 to 53.5 inches); moderately cemented sandstone and siltstone bedrock.

Shelocta silt loam; 10KY-125-FSC-02

Particle Size Analysis

Depth	Horizon	Sand Fractions (%)					Total (%)			Textural Class
(cm)		VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-3	**A_1**	2.8	7.1	8.4	19.3	12.6	50.2	39.8	10.0	L
3-13	**A_2**	3.1	1.9	3.1	19.1	15.9	43.1	44.1	12.8	L
13-22	**BA**	2.7	2.3	3.5	20.3	14.5	43.3	41.5	15.2	L
22-66	**Bt_1**	3.2	1.9	3.2	16.6	14.7	39.6	41.1	19.3	L
66-91	**Bt_2**	1.6	1.6	5.6	23.8	12.1	44.7	35.8	19.5	L
91-116	**BC**	0.9	1.6	12.4	35.6	11.4	61.9	23.3	14.8	SL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL –silty clay loam, SIC – silty clay, CL – clay loam.

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
BC	4.2		0.1	0.3	0.2	0	0.6	6.4	6.5	9.4			

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 87KY-045-006
Soil Name As Correlated: Trappist, silt loam
Classification: Fine, mixed, semiactive, mesic Typic Hapludults

Description Date: 6/09/1987 **Describers:** H.S. Evans and T.C. Fristoe
Location Description: Casey Co, KY; 1 mile west of Effisburg; 0.3 mile north of KY Hwy 78 on farm road to top of ridge.

Landscape Position: Upland, backslope
Slope: 9 percent
Drainage: Well drained
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Pasture land and native pasture
Parent Materials: Residuum from shale-noncalcareous materials
Restrictions: Paralithic bedrock: 84 to 96 centimeters (33.1 to 37.8 inches) and Lithic bedrock: 96 centimeters (37.8 inches)

Ap --- 0-15 cm; dark yellowish brown (10YR 4/4) moist, silt loam; weak fine granular structure; friable; many fine roots throughout; abrupt smooth boundary.

Bt_1 --- 15-28 cm; yellowish brown (10YR 5/6) moist, silty clay loam; moderate fine subangular blocky parting to moderate medium subangular blocky structure; firm; common fine roots throughout; few very fine tubular high continuity pores; 30 percent (common) continuous distinct clay films on all faces of peds; gradual wavy boundary.

Bt_2 --- 28-64 cm; strong brown (7.5YR 5/6) moist, silty clay; 1 percent fine distinct brown (10YR 5/3) mottles; strong fine angular blocky parting to strong fine subangular blocky structure; very firm; moderately few fine roots throughout; 30 percent (common) continuous distinct clay films on all faces of peds; 10 percent shale fragments; gypsum is streaked on ped faces; gradual wavy boundary.

C --- 64-84 cm; 40 percent reddish brown (5YR 4/3) moist, 30 percent gray (5YR 6/1) moist and 30 percent yellowish red (5YR 5/6) moist; massive; weathered shale; colors are variegated; abrupt smooth boundary.

Cr --- 84-96 cm; black (5YR 2/1) weathered shale; platy structure; abrupt smooth boundary.

R --- 96-124 cm; black (5YR 2/1) unweathered shale; platy structure.

Trappist silt loam; 87KY-045-006

Particle Size Analysis

Depth	Horizon	Coarse Fragments	Sand Fractions (%)					Total (%)			Textural Class
(cm)		2-76 mm	VCS	CS	MS	FS	VFS	Sand	Silt	Clay	
0-15	**Ap**		2.0	2.8	1.4	1.8	1.3	9.3	69.7	21.0	SIL
15-28	**Bt_1**	3.8	2.1	1.1	0.6	0.6	0.6	5.0	58.0	37.0	SICL
28-64	**Bt_2**	3.1	2.8	0.9	0.3	0.5	0.5	5.0	49.9	45.1	SIC
64-84	**C**		5.7	2.3	0.5	0.6	0.6	9.7	48.1	42.2	SIC
84-96	**Cr**		4.4	2.2	0.7	1.0	1.0	9.3	50.3	40.4	SIC/SICL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand,
VFS – very fine sand; SIL – silt loam

Chemical Properties

Horizon	pH		Exchangeable Bases (meq/100 g)				Sum of Bases	CEC	Ext. Acid.	Base Sat	$CaCO_3$ Eq.	OM	Bray P
	1:1 Water	1:1 KCl	Ca	Mg	K	Na	(meq/ 100 g)	(meq/ 100 g)	(meq/ 100 g)	(%)	(%)	(%)	(mg/L)
Ap	4.9		3.3	1.1	0.7	0.1	5.2	13.2	8.5	38	0.1	5.9	83
Bt_1	4.9		1.7	0.4	0.4	0.1	2.6	12.3	10.6	21	0.6	1.6	30
Bt_2	4.9		1.7	0.4	0.4	0.1	2.6	14.1	13.3	18	0.1	0.8	6
C	4.5		1.0	0.2	0.3	0.1	1.6	13.7	13.5	12	0.1	2.1	2
Cr	4.3		0.6	0.1	0.3	0.1	1.1	14.0	17.4	8	0.1	3.9	1

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Clay Mineralogy

Horizon	Clay Mineral Content (%)										
	SM	V	V/HIV	CL	INT	K	MI	Q	GI	GO	F
Bt_1			10		12	12	40	18		5	3
Bt_2			8		10	8	45	20		2	1

Minerals: SM = smectite; V = vermiculite; HIV = hydroxyinterlayered vermiculite; CL = chlorite; INT = interstratified; K= kaolinite; MI = mica; Q = quartz; GO = goethite; GI = gibbsite; F = feldspars.

Pedon ID: 07KY-055-02
Soil Name As Correlated: Wilbur, silt loam
Classification: Coarse-silty, mixed, superactive, mesic, Fluvaquentic Eutrudepts

Description Date: 05/31/2007 **Describers:** KES
Location Description: Crittenden County, KY; Piney Creek, Steven Hill farm.
Lat: 37.367 N Long: 87.927 W

Landscape Position: Floodplain
Slope: 0-2 percent
Drainage: Moderately well drained
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Grass, filter strip
Parent Materials: Alluvium

Ap – 0-20 cm; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; very friable; abrupt smooth boundary.

Bw$_1$ – 20-40 cm; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; very friable; common medium faint brown (10YR 4/3), moist, iron and manganese masses with clear boundaries in the matrix, and common coarse distinct black (10YR 2/1), dry, iron and manganese masses with sharp boundaries in the matrix; clear smooth boundary.

Bw$_2$ – 40-58 cm; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; very friable; common coarse faint brown (10YR 5/3), moist, iron depletions with clear boundaries in the matrix, and few fine distinct black (10YR 2/1), dry, iron and manganese masses with sharp boundaries in the matrix, clear smooth boundary.

Bw$_3$ – 58-84 cm; brown (10YR 5/3) silt loam; weak medium subangular blocky structure; very friable; common medium distinct black (10YR 2/1), dry, iron and manganese masses with sharp boundaries in the matrix, and common coarse faint light grayish brown (10YR 6/2), moist, iron depletions with clear boundaries in the matrix; clear smooth boundary.

Bg—84-132 cm; light grayish brown (10YR 6/2) silt loam; medium subangular blocky structure; very friable; common medium faint gray (10YR 6/1), moist, iron depletions with clear boundaries in the matrix, and few fine prominent yellowish brown (10YR 5/6), moist, iron depletions with sharp boundaries in the matrix, and common coarse prominent black (10YR 2/1), dry, iron and manganese masses with sharp boundaries in the matrix; clear smooth boundary.

C – 132-163 cm; brown (10YR 5/3) silt loam; massive structure; very friable; common coarse distinct black (10YR 2/1), dry, iron and manganese masses with sharp boundaries in the matrix, and common medium distinct gray (10YR 6/1), moist, and common medium prominent yellowish brown (10YR 5/6), moist, iron depletions with sharp boundaries in the matrix.

Wilbur silt loam; 07KY-055-02

Particle Size Analysis

Depth (cm)	Horizon	Sand Fractions (%) VCS	CS	MS	FS	VFS	Total (%) Sand	Silt	Clay	Textural Class
0-20	**Ap**	0.2	1.0	1.1	2.2	3.4	7.9	82.5	9.6	SIL
20-40	**Bw$_1$**	0.2	0.4	0.7	1.8	2.9	6.0	82.8	11.2	SIL
40-58	**Bw$_2$**	0.7	0.7	0.6	2.5	3.1	7.6	79.5	12.9	SIL
58-84	**Bw$_3$**	0.7	1.1	0.7	2.7	3.3	8.5	78.4	13.1	SIL
84-132	**Bg**	1.3	2.0	1.4	3.0	4.4	12.1	79.0	8.9	SIL
132-163	**C**	0.5	1.1	1.7	8.1	6.2	17.6	70.4	12.0	SIL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH 1:1 Water	pH 1:1 KCl	Exchangeable Bases (meq/100 g) Ca	Mg	K	Na	Sum of Bases (meq/100 g)	CEC (meq/100 g)	Ext. Acid. (meq/100 g)	Base Sat (%)	$CaCO_3$ Eq. (%)	OM (%)	Bray P (mg/L)
Ap	5.6												
Bw$_1$	6.0												
Bw$_2$	6.3												
Bw$_3$	6.5												
Bg	6.4												
C	4.9		1.0	0.8	0.1		1.9	7.7	8.2	25			

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

Pedon ID: 86KY-139-10
Soil Name As Correlated: Zanesville, silt loam
Classification: Fine-silty, mixed, active, mesic Oxyaquic Fragiudalfs

Description Date: 05/06/1986 **Describers:** J. Robbins, K. Bates, R. Forsythe, K. Scott
Location Description: Livingston Co, KY; 433 yards due south of a point on KY Hwy 133 that is about 773 yards east of the junction of Ky Hwy 133 and Cave Spring-Carrsville Rd; about 3.4 miles northwest of Joy.
Latitude: 37° 21’ 53”N Longitude: 88° 26’ 23”

Landscape Position: Upland, upper side slope
Slope: 13 percent
Drainage:
Primary Earth Cover: Grass/herbaceous cover
Existing Vegetation: Weeds and cockle burs
Parent Materials: Loess over sandstone residuum from Bethel sandstone geological formation.

Ap – 0-15 cm; dark yellowish brown (10YR 4/4) silt loam; moderate fine and medium granular structure; friable; few fine roots; medium acid; abrupt smooth boundary.

Bt – 15-46 cm; strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; thin discontinuous dark brown (7.5YR 4/4) clay films on ped faces; strongly acid; clear smooth boundary.

Bx/E – 46-56 cm; yellowish brown (10YR 5/4) and dark brown (7.5YR 4/4) silt loam; many medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; few discontinuous clay films; few fine roots; very strongly acid; clear smooth boundary.

Btx – 56-89 cm; dark brown (7.5YR 4/4) silt loam; many medium distinct light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure; firm and brittle; few fine roots along prism faces; few discontinuous yellowish brown (10YR 5/4) clay films on faces of peds; few black stains; very strongly acid; gradual wavy boundary.

$2C_1$ – 89-124 cm; yellowish brown (10YR 5/6) silt loam; moderate very coarse prismatic structure; firm; few fine roots along faces of peds; few medium distinct grayish brown (10YR 5/2) streaks; slightly acid; gradual wavy boundary.

$2C_2$ – 124-173 cm; strong brown (7.5YR 5/6) silt loam; moderate very coarse prismatic structure; firm; few fine roots along ped faces; few medium distinct grayish brown (10YR 5/2) streaks; neutral; gradual wavy boundary.

$2C_3$ – 173-198 cm; yellowish brown (10YR 5/6) very channery silt loam; massive; firm; 70 percent sandstone channers; neutral.

Zanesville silt loam; 86KY-139-10

Particle Size Analysis

Depth (cm)	Horizon	Sand Fractions (%) VCS	CS	MS	FS	VFS	Total (%) Sand	Silt	Clay	Textural Class
0-15	**Ap**	0.6	0.5	0.4	1.1	3.6	6.2	77.8	16.0	SIL
15-46	**Bt**	0.0	0.1	0.1	0.6	1.9	2.7	70.3	27.0	SIL/SICL
46-56	**Bx/E**	0.0	0.3	0.3	0.8	3.0	4.4	69.4	26.2	SIL
56-89	**Btx**	0.1	0.1	0.7	1.4	1.6	3.9	70.2	25.9	SIL
89-124	**$2C_1$**	0.1	0.4	0.9	8.2	2.8	12.4	64.4	23.2	SIL
124-173	**$2C_2$**	0.2	0.6	1.4	16.7	3.7	22.6	56.3	21.1	SIL
173-198	**$2C_3$**	10.4	4.2	3.8	25.4	4.5	48.3	27.5	24.2	L/SCL

VCS- very coarse sand, CS – coarse sand, MS – medium sand, FS – fine sand, VFS – very fine sand; SIL – silt loam, SICL – silty clay loam, SIC – silty clay, C – clay.

Chemical Properties

Horizon	pH 1:1 Water	pH 1:1 KCl	Exchangeable Bases (meq/100 g) Ca	Mg	K	Na	Sum of Bases (meq/ 100 g)	CEC (meq/ 100 g)	Ext. Acid. (meq/ 100 g)	Base Sat (%)	$CaCO_3$ Eq. (%)	OM (%)	Bray P (mg/L)
Ap	6.1		5.3	0.9	0.2	0.3	6.7	6.9	9.1	97		1.9	9
Bt	5.6		4.2	2.1	0.3	0.2	6.8	7.7	7.1	88		0.6	3
Bx/E	5.0		2.1	2.3	0.2	0.3	4.9	8.0	14.1	61		0.3	5
Btx	5.5		2.1	2.7	0.2	0.5	5.5	9.4	11.6	58		0.2	5
$2C_1$	6.1		2.6	2.8	0.1	0.7	6.2	7.3	3.7	85		0.2	5
$2C_2$	6.8		3.2	3.2	0.1	0.7	7.2	8.0	0.9	90		0.6	8
$2C_3$	6.4		2.4	2.0	0.1	0.6	5.1	8.1	1.2	63		0.2	7

CEC- cation exchange capacity, Ext. Acid. – extractable acidity, Base Sat – base saturation, $CaCO_3$ Eq.- Calcium carbonate equivalent, OM –organic matter.

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