ADRIAN SERIES

The Adrian series consists of very deep, very poorly drained soils formed in herbaceous organic materials over sandy deposits on outwash plains, lake plains, lake terraces, flood plains, moraines, and till plains.

GEOGRAPHIC SETTING

Adrian soils are in shallow closed depressions primarily on outwash plains, lake plains, lake terraces, and flood plains, but can occur within moraines and till plains. Areas range from a few acres to several hundred acres in size. Slope gradients range from 0 to 1 percent. Adrian soils formed in herbaceous organic materials over sandy deposits. Adjacent upland soils are usually sandy. Mean annual precipitation ranges from 737 to 1143 mm (29 to 45 inches). Mean annual temperature ranges from 8.9 to 11.7 degrees C (48 to 53 degrees F). Frost-free period is 120 to 180 days. Elevation is 177 to 466 meters (580 feet to 1,530 feet) above mean sea level.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY

Very poorly drained. Depth to the top of an apparent seasonal high water table ranges from 30 cm (1 foot) above the surface to 30 cm (1 foot) below the surface between September and June in normal years. Potential for surface runoff is negligible. Saturated hydraulic conductivity is moderately high or high in the organic material and high or very high in the sandy material. Permeability is moderately slow to moderately rapid in the organic material and rapid in the sandy material. In the flooded phase, areas are subject to frequent flooding for long periods between October and June.

USE AND VEGETATION

Most of this soil is in native vegetation. Much of it is in marsh grasses including sedges, reeds, grasses, and shrubs such as willow, alder, quaking aspen, and dogwood. Some areas have been drained to various degrees and are used for hay and pasture. A small proportion is used for cropland. Corn and truck crops are the principal crops.

TYPICAL PEDON

Adrian muck, on a less than 1 percent slope under marsh vegetation at an elevation of 199 meters (654 feet) above mean sea level. (Colors are for moist soil unless otherwise stated.)

Oa1—0 to 41 cm (16 inches); black (10YR 2/1) broken face, black (N 2.5/) rubbed muck (sapric material); about 12 percent fiber, less than 5 percent rubbed; moderate medium granular structure; primarily herbaceous fibers; neutral [pH 7.0 in water]; abrupt wavy boundary.
Oa2--41 to 51 cm (16 to 20 inches); black (10YR 2/1) broken face, very dark brown (10YR 2/2) rubbed muck (sapric material); about 15 percent fiber, less than 5 percent rubbed; weak coarse subangular blocky structure; primarily herbaceous fibers; slightly acid [pH 6.5 in water]; gradual wavy boundary.

Oa3--51 to 69 cm (20 to 27 inches); black (10YR 2/1) broken face, black (10YR 2/1) rubbed muck (sapric material); about 12 percent fiber, less than 5 percent rubbed; weak thick platy structure; primarily herbaceous fibers; moderately acid [pH 6.0 in water]; gradual wavy boundary.

Oa4--69 to 86 cm (27 to 34 inches); black (10YR 2/1) broken face, black (10YR 2/1) rubbed muck (sapric material); about 12 percent fiber, less than 5 percent rubbed; massive; primarily herbaceous fibers; strongly acid [pH 5.5 in water]; abrupt smooth boundary. [Combined thickness of the Oa horizon is 41 to 130 cm (16 to 51 inches).]

Cg1--86 to 152 cm (34 to 60 inches); gray (10YR 5/1) sand; single grain; loose; common medium prominent light olive brown (2.5Y 5/4) masses of oxidized iron in the matrix; slightly alkaline; clear wavy boundary.

Cg2--152 to 203 cm (60 to 80 inches); dark gray (2.5Y 4/1) fine sand; single grain, loose; strongly effervescent; moderately alkaline.

RANGE IN CHARACTERISTICS

Soil temperature: difference between mean summer and mean winter soil temperature is 17 to 25 degrees F or more. Depth to the sandy C horizon: 41 to 130 cm (16 to 51 inches). Organic materials: derived primarily from herbaceous plants, but some layers contain as much as 50 percent material of woody origin.
CONOVER SERIES

The Conover series consists of very deep, somewhat poorly drained soils formed in loamy till on low parts of moraines and till plains.

GEOGRAPHIC SETTING

Conover soils typically are on low parts of moraines and till plains. Slope gradients range from 0 to about 6 percent, and dominant slopes are from 1 to 4 percent. Conover soils formed in loamy till. Mean annual precipitation ranges from 737 to 940 mm (29 to 37 inches). Mean annual temperature ranges from 7.8 to 10.6 degrees C (46 to 51 degrees F). Frost-free period is 130 to 180 days. Elevation is 177 to 466 meters (580 to 1,530 feet) above mean sea level.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY

Somewhat poorly drained. The potential for surface runoff ranges from low to high. Saturated hydraulic conductivity is moderately high. Permeability is moderate or moderately slow.

USE AND VEGETATION

Most areas are cultivated. Corn, beans, small grain, and legume-grass hay are the principal crops. A small part is in forest. Native vegetation is hardwood forest.

TYPICAL PEDON

Conover loam, on a convex, 2 percent slope in a cultivated field at an elevation of 276 meters (907 feet) above mean sea level. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 23 cm (9 inches); very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many fine roots; about 5 percent gravel; slightly acid; abrupt smooth boundary. [18 to 25 cm (7 to 10 inches) thick]

Bw--23 to 28 cm (9 to 11 inches); dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable; common fine roots; common medium distinct yellowish brown (10YR 5/6) masses of oxidized iron; common medium distinct grayish brown (10YR 5/2) iron depletions; about 5 percent gravel; slightly acid; clear wavy boundary. [0 to 15 cm (6 inches) thick]

Bt1--28 to 48 cm (11 to 19 inches); yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; firm; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; common fine distinct grayish brown (10YR 5/2) iron depletions; about 5 percent gravel; slightly acid; gradual wavy boundary.

Bt2--48 to 69 cm (19 to 27 inches); brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in pores; common medium distinct grayish brown (10YR 5/6) masses of oxidized iron; common medium prominent gray (10YR 6/1) iron depletions; about 5 percent gravel;
slightly acid; gradual wavy boundary. [Combined thickness of the Bt horizon is 20 to 61 cm (8 to 24 inches).]

**Cg1**--69 to 127 cm (27 to 50 inches); light brownish gray (10YR 6/2) loam; weak medium subangular blocky structure; firm; common medium distinct yellowish brown (10YR 5/4) masses of oxidized iron; common medium faint gray (10YR 6/1) iron depletions; about 5 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.

**Cg2**--127 to 152 cm (50 to 60 inches); light brownish gray (10YR 6/2) loam; massive; firm; common medium prominent strong brown (7.5YR 5/6) masses of oxidized iron; common medium faint gray (10YR 6/1) iron depletions; about 5 percent gravel; slightly effervescent; slightly alkaline.

**RANGE IN CHARACTERISTICS**

Thickness of the solum: 61 to 102 cm (24 to 40 inches).
Depth to carbonates: 61 to 102 cm (24 to 40 inches).
Rock fragment content: 0 to 10 percent throughout the solum.
HOUGHTON SERIES

The Houghton series consists of very deep, very poorly drained soils formed in herbaceous organic materials more than 130 cm (51 inches) thick in depressions on lake plains, outwash plains, ground moraines, end moraines, and floodplains.

GEOGRAPHIC SETTING

Houghton soils are in closed depressions on lake plains, outwash plains, ground moraines, end moraines, and flood plains. Slope gradients are less than 2 percent. Houghton soils formed in herbaceous organic materials more than 130 cm (51 inches) thick. Mean annual precipitation ranges from 762 to 1067 mm (30 to 42 inches). Mean annual temperature ranges from 8.9 to 11.7 degrees C (48 to 53 degrees F).

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY

Very poorly drained. Depth to the seasonal high water table ranges from 61 cm (2 feet) above the surface in ponded phases to 30 cm (1 foot) below the surface between September and June in normal years. Potential for surface runoff is very slow or ponded. Saturated hydraulic conductivity is moderately high or high. Permeability is moderately slow to moderately rapid.

USE AND VEGETATION

A considerable area of these soils is used for cropland or pasture. Common crops are onions, lettuce, potatoes, celery, radishes, carrots, mint, and some corn. Native vegetation is primarily of marsh grasses, sedges, reeds, buttonbush, and cattails, with some water-tolerant trees near the margins of the bogs.

TYPICAL PEDON

Houghton muck, on a level area in a cultivated field. (Colors are for moist soils unless otherwise stated.)

Oa1—0 to 23 cm (9 inches); black (N 2.5/) broken face and rubbed muck (sapric material); about 5 percent fiber, a trace rubbed; weak coarse subangular blocky structure; neutral [pH 7.0 in KCl]; abrupt smooth boundary.

Oa2—23 to 33 cm (9 to 13 inches); black (N 2.5/) broken face, very dark brown (7.5YR 2/2) rubbed muck (sapric material); about 5 percent fiber, a trace rubbed; weak medium granular structure; neutral [pH 7.0 in KCl]; abrupt smooth boundary.

Oa3—33 to 61 cm (13 to 24 inches); dark reddish brown (5YR 3/2) broken face, dark reddish brown (5YR 2/2) rubbed muck (sapric material); about 15 percent fiber, less than 5 percent rubbed; massive, breaking to thick platy fragments; neutral [pH 7.0 KCl]; abrupt smooth boundary.

Oa4—61 to 81 cm (24 to 32 inches); black (5YR 2/1) broken face and rubbed muck (sapric material); about 10 percent fiber, a trace
rubbed; massive; about 1 percent woody fragments; neutral [pH 7.0 in KCl]; clear wavy boundary.

**Oa5**--81 to 122 cm (32 to 48 inches); dark reddish brown (5YR 2/2) broken face, black (5YR 2/1) rubbed muck (Sapric material); about 20 percent fiber, less than 10 percent rubbed; massive, breaking to thick platy fragments; neutral [pH 7.0 in KCl]; abrupt smooth boundary.

**Oa6**--122 to 203 cm (48 to 80 inches); dark reddish brown (5YR 2/2) broken face and rubbed muck (sapric material); about 10 percent fiber, less than 10 percent rubbed; massive; slightly sticky; about 15 percent mineral soil; neutral [pH 7.0 in KCl].

**RANGE IN CHARACTERISTICS**

Thickness of the organic material: more than 130 cm (51 inches).
Organic fibers: derived primarily from herbaceous plants, but some layers contain as much as 30 percent woody material.
Woody fragment content: averages less than 15 percent by volume in the control section.
Reaction: very strongly acid to slightly alkaline throughout.
**MIAMI SERIES**

The Miami series consists of very deep, moderately well drained soils that are moderately deep to dense till.

**GEOGRAPHIC SETTING**

Miami soils are on till plains. Slope gradients are dominantly 0 to 25 percent, but range to 60 percent. Miami soils formed in as much as 46 cm (18 inches) of loess or silty material and in the underlying loamy till. Mean annual precipitation ranges from 762 to 1067 mm (30 to 42 inches). Mean annual temperature ranges from 7.8 to 12.2 degrees C (46 to 54 degrees F). Frost-free period is 140 to 180 days. Elevation is 183 to 366 meters (600 to 1200 feet) above mean sea level.

**DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY**

Moderately well drained. Depth to the top of an intermittent perched high water table ranges from 61 to 91 cm (2.0 to 3.0 feet) between December and April in normal years. Potential for surface water runoff is medium on the gentle slopes and high on the steeper slopes. Saturated hydraulic conductivity is moderately high in the solum and moderately low or low in the underlying dense till. Permeability is moderate in the upper part of the solum, moderately slow in the lower part of the solum, and slow or very slow in the underlying dense till.

**USE AND VEGETATION**

Most areas are used to grow corn, soybeans, small grain, and hay. Much of the more sloping part is in permanent pasture or forest. Native vegetation is deciduous forest.

**TYPICAL PEDON**

Miami silt loam, on a convex, 3 percent slope in a cultivated field at an elevation of about 268 meters (880 feet) above mean sea level. (Colors are for moist soil unless otherwise stated.)

- **Ap**--0 to 20 cm (0 to 8 inches); brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; neutral; abrupt smooth boundary. [15 to 25 cm (6 to 10 inches) thick]

- **Bt1**--20 to 33 cm (8 to 13 inches); dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; many distinct brown (7.5YR 4/4) clay films on faces of peds and as linings of some pores; 1 percent rock fragments; moderately acid; abrupt wavy boundary. [0 to 20 cm (0 to 8 inches) thick]

- **2Bt2**--33 to 58 cm (13 to 23 inches); dark yellowish brown (10YR 4/4) clay loam; strong coarse subangular blocky structure; firm; many distinct brown (7.5YR 4/4) clay films on faces of peds and as linings of some pores; 2 percent rock fragments; strongly acid; clear wavy boundary.
**2Bt3**--58 to 79 cm (23 to 31 inches); dark yellowish brown (10YR 4/4) clay loam; moderate coarse subangular blocky structure; firm; many distinct brown (7.5YR 4/4) clay films on faces of peds and as linings of some pores; common fine and medium spherical very dark gray (10YR 3/1) iron-manganese masses in the matrix; 5 percent rock fragments; moderately acid; clear wavy boundary. [Combined thickness of the 2Bt horizon is 30 to 51 cm (12 to 20 inches).]

**2BCt**--79 to 91 cm (31 to 36 inches); brown (10YR 4/3) loam; weak coarse prismatic structure; friable; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine and medium irregular very dark gray (10YR 3/1) iron-manganese masses in the matrix; common medium faint light brownish gray (10YR 6/2) irregular iron depletions in the matrix; 5 percent rock fragments; slightly effervescent; slightly alkaline; clear irregular boundary. [0 to 25 cm (0 to 10 inches) thick]

**2Cd**--91 to 203 cm (36 to 80 inches); brown (10YR 5/3) loam; massive; very firm; few fine irregular very dark gray (10YR 3/1) iron-manganese masses in the matrix; common medium faint grayish brown (10YR 5/2) irregular iron depletions in the matrix; 5 percent rock fragments; strongly effervescent; moderately alkaline.

**RANGE IN CHARACTERISTICS**

- Thickness of the loess or silty material: 0 to 46 cm (0 to 18 inches).
- Depth to the base of the argillic horizon: 61 to 102 cm (24 to 40 inches).
- Depth to densic contact: 61 to 102 cm (24 to 40 inches).
- Depth to carbonates: 51 to 102 cm (20 to 40 inches).
- Depth to bedrock: greater than 203 cm (80 inches).

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The above information was condensed from the Official Soil Series Descriptions available from the USDA Natural Resources Conservation Service: