

Iowa Soils

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Introduction

The importance of soil as a resource to the world is reflected in 2015 being named as the International Year of Soils by the 68th General Assembly of the United Nations. The objectives were:

To create full awareness among a civil society and decision makers about the fundamental roles of soils for human life;

To achieve full recognition of the prominent contributions of soils to food security, climate change adaptations, and mitigation and sustainable development;

To promote effective policies and actions for the sustainable management and protection of soil resources;

To sensitize decision makers about the need for robust investment in sustainable soil management activities aiming at healthy soils for different land users and population groups;

To catalyze initiatives in connection with the Sustainable Development Goals and post 2015 agendas to advocate rapid enhancement of capacities and systems for soil information collection and monitoring at all levels (global, regional, and national).

The Iowa Legislature passed House Resolution 31 that “recognizes the essential role of Iowa soils in supporting a thriving economy and healthy environment and ensuring a sustainable and productive future for the people of the State of Iowa.”

A recent series of articles in the Des Moines Register related to the World Food Prize had the following statement: “This is the International Year of Soils, but you wouldn’t know it. War and pestilence might kill large numbers of people, but in most cases the population recovers. But lose the soil and everything goes with it. This is what topples civilizations.” (Monbiot, 2015)

Soil Forming Factors in Iowa

Iowa soils are the product of the interaction of the five classic soil forming factors: climate, vegetation (organisms), relief (topography), parent material, and time, but many researchers now include humans as a major factor also. Iowa soils are recognized as some of the most productive soils in the world. One of the striking characteristics of many Iowa soils is the dark color due to the accumulation of organic matter from the native prairie vegetation. Approximately 80 percent of Iowa soils formed under native prairie vegetation. Organic matter content has been reduced due to cultivation during the past 160 years, which results in oxidation of the organic matter and accelerated erosion, which physically moves soil particles and associated organic matter.

Accelerated erosion results from intensive land use and absence of ground cover during precipitation events. It has reduced the organic matter content of many of the soils, especially the soils on slopes that have been used for intensive row crop production. However, 60.9 percent of Iowa soils have slope gradients of < 5 percent (Figure 1), which reduces the potential for water erosion.

Another characteristic of Iowa soils is their textures. Over 80 percent of the soils have textures of silt loam, silty clay loam, loam, or clay loam in both the surface and subsurface horizons, which when coupled with organic

matter, have a high to very high plant available water holding capacity of 2 in. or more per cubic ft of soil. Major parent materials (material the soils form from) are loess (40%), drift (till and outwash, 40%) and alluvium (15%). Other minor parent materials are organic materials (peat and muck) and bedrock. Climate (present and past temperature and precipitation) is a major factor in soil formation. It influences the native vegetation under which the soils form and also impacts the amount of water available for leaching. Most of the major parent materials in Iowa were calcareous so one of the initial processes in soil formation

that occurs is leaching of the carbonates by infiltrating water.

The ISU Agriculture Experiment Station manages 13 research and demonstration farms located in 12 of the 13 major soil association areas across Iowa (see report cover or website). The farms are located regionally to best represent the different kind of soils that occur in each of the major soil areas and associated agricultural enterprises.

A detailed description of the ISU research and demonstration farms is posted at <http://farms.ag.iastate.edu/>.

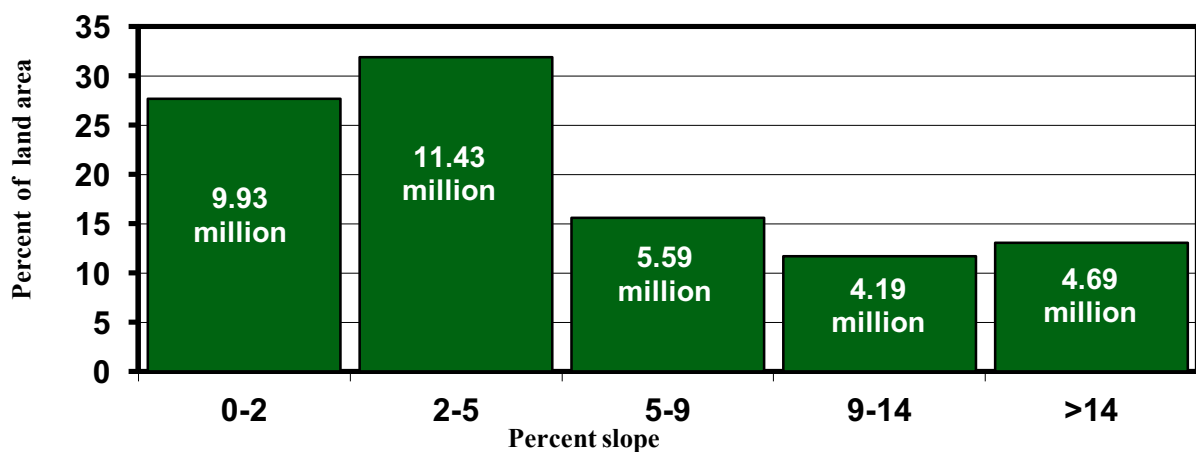


Figure 1. Estimated percent and acreage of Iowa farmland by soil slope.