

Arkansas Soil Erosion and Conservation Methods in Ornamental Landscapes



Abby Cutsinger & Michael Bradley, Ph.D.

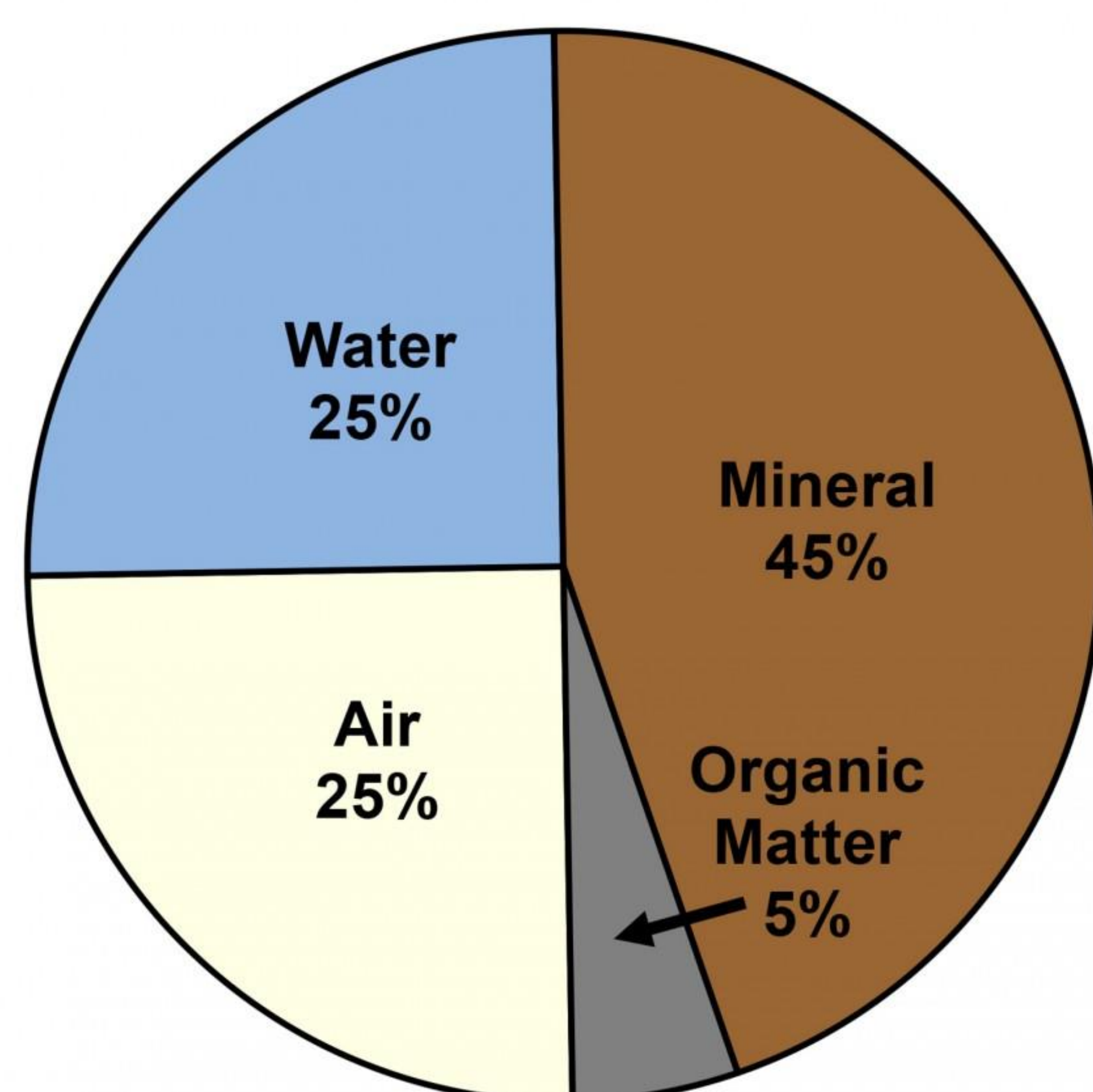
Summary

This study will attempt to identify the best soil erosion mitigation methods for Arkansas ornamental landscape settings by comparing the strengths and weaknesses of known techniques. Since soil is not a renewable resource, we must apply conservation practices wherever possible, not just in agricultural settings. To determine the most effective erosion prevention techniques, this study will review soil studies conducted by the NRCS and NASA, as well as articles on best practices observed in ornamental landscape and agricultural industries. These are analyzed by comparing and contrasting techniques against known problems with Arkansas soil to determine which methods are most effective.

Discussion

When discussing the problem of soil erosion, it is important to understand the fundamentals of soil composition. To be most useful, soil should ideally consist of 50% matter and 50% pore space (Londeree, n.d.). Further broken down, these halves should include 5% organic matter, 45% minerals, 25% air, and 25% water (Londeree, n.d.). The mineral portion of the soil should consist of silt, clay, and sand so that there is enough pore space for the necessary air and water (Londeree, n.d.). This composition ensures that the soil is conditioned enough for water to drain properly, air to access the roots of plants, and for those roots to grow deeply. The balance of organic matter and minerals is important for giving plants access to proper nutrients. The high mineral content provides an anchor so that plants are not moved by elements such as animals, water, or wind.

Soil Composition



Much of Arkansas has silt, clay, and rocky soil types, often mixed together or coexisting within the same plot of land (National Resources Conservation Service, n.d.). The problem with silt and clay is that 1) They have very small particles, leaving barely any room for water and air to get through, 2) They drain very poorly, and 3) Roots have difficulty anchoring deeply into the soil. This composition is far from ideal and actually leads these Arkansas soils to erode quickly and easily, removing the topsoil that is more rich in organic matter. While eroding away these silty clay soils may seem beneficial, clay soils are actually quite high in nutrients. All the soil needs is to be conditioned so that plants can access its rich stores of nutrients. So rather than allowing this treasure to be washed and blown away, they need to be carefully protected and conditioned so that they can be utilized more effectively.

Methods

There are many erosion prevention methods that have been developed for both ornamental and agricultural use. Of these methods, there are some that are more sustainable or easier to implement than others. It should be noted that, where erosion is a common struggle, widespread tilling should be avoided. Some gardeners till their soil to condition it before planting, especially when planting seeds, but this practice actually allows soil to loosen quickly if subjected to rain, flooding, or general watering practices (NASA, 2021).

Common erosion prevention practices include:

- Adding mulch or compost on top of the soil, which conditions the soil, increasing pore space, and allows plant roots to spread out and anchor the soil (NASA, 2021). This method takes decades to deeply amend the soil and is itself greatly susceptible to erosion. To deeply amend the soil involves deep tilling, which should be avoided in erosion-prone areas (NASA, 2021). This method is also expensive and requires regular maintenance to replace mulch or compost that has eroded.
- Terracing or creating contours to slow and guide the movement of water through the soil is an effective solution for gardens on slopes (NASA, 2021). Outside of this application, terracing has limited use.
- The use of native groundcovers is a method that is growing in popularity (NASA, 2021). Using native plants as a groundcover or cover crop helps the soil to drain quicker and remain more stable thanks to the deep, expansive root systems (NASA, 2021). These native plants are accustomed to the native soil and have little difficulty pushing through to survive the challenges. Ground covers with more shallow root systems can be used as well, helping to anchor and amend the topsoil with organic matter. This solution does take either time or expense in order to fill in a more expansive garden.
- Landscape fabric is a common solution in ornamental gardens for holding soil in place and keeping weeds at bay. Unfortunately, this method is ineffective with clay soils, as water can still penetrate through the fabric and pool on top of the soil, creating contours that exacerbate the issue.

Results

Soil conservation is an essential part of natural resource conservation, as it takes thousands of years for more soil to be created and mere days for it to be destroyed. Based on the available methods, the most effective erosion control method in ornamental landscapes is the use of groundcovers, which hold soil in place at a deeper level than a solution like mulch or landscape fabric. Groundcovers also aid in soil amendment by contributing to nitrogen fixation, water penetration, drainage, and increasing soil pore space. By contrast, solutions like landscape fabric and rock can cause irregularities in the soil's surface, which increases the likelihood of erosion, or compaction of pore space over time, which decreases the soil's usability. The uses for groundcovers are similar to that of cover crops in agricultural settings. Using plants to hold soil in place promotes a healthy ecosystem and aids the Arkansas landscaper in soil amendments for rocky, clay soil. Use of groundcovers also aids the landscaper by reducing time and labor needs, because it reduces the need for heavy fertilizers, weeding, and herbicides.

References Available Upon Request