

## SOILS

# Healthy soil aids drought and flood management

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**You may think** the common thread between drought and flood is water or living in the Southern Great Plains. While these may be true, the shared fac-

tor to both is soil.

Other than the lack or abundance of precipitation, the reason for droughts and floods is the soil's inability to effectively absorb and release water. This is true in both grassland and farmland. In the process of absorbing and releasing water, healthy soils naturally ameliorate both drought and flood.

Why are soils ineffective at absorbing and releasing water? There are many reasons, such as limited soil depth, low porosity, soil crusts and low organic matter. Notice I did not mention soil texture. This is because healthy soils, whether they are sand or clay or anything in between, absorb and release water for plant growth. The key word being "healthy."

We cannot always control soil depth. Many areas in the Southern Great Plains are limited by shallow soils over impermeable layers. However, many soils are made artificially shallow by a plow pan or compacted layer created by tillage. If a soil is 40



inches deep, but a plow pan exists at 8 inches, then only 20 percent of the soil's ability to hold and release water is being used. Think how important the other 32 inches of water-holding and -releasing capacity could be.

Soil porosity is a measure of voids in a given volume of soil. These voids provide spaces in the soil for holding water. When the voids are connected to each other in healthy soil, they create pores for water to move deep into the soil and be stored during precipi-

tation. Healthy soils with good porosity absorb and store water that would otherwise run off and create flooding. Later, these same pores allow roots to grow deep into the soil and recover the water during drought.

Crusts can form on bare soil surfaces. These crusts can be biological or physical. The biological crusts are created by soil microorganisms. Physical crusts are created when loose individual soil particles fill in and seal off the soil pores at the soil ►

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surface. Precipitation that is unable to effectively penetrate a crusted soil runs off and can create flooding. Since the water from the precipitation did not penetrate the soil to be absorbed, drought ensues.

Organic matter can be thought of like a giant sponge. Soils on the Great Plains typically had around 5 percent organic matter prior to European settlement. Since then, soil organic matter on farmed soils has

decreased to around 1 percent. A great deal of this loss in organic matter can be attributed to tillage. Every 1 percent of organic matter in the top 8 inches of soil can hold 18,000 gallons of water per acre. That is the equivalent of 0.67 inches of rainfall held in the soil for later use by plants. It is often said it doesn't matter how much it rains, but how much of it you can use. Organic matter makes rainfall more useable.

So what can we do to reduce droughts and floods? Manage for healthy soil. Use no-till or reduced-till farming methods, rotate deep-rooted crops, use cover crops, manage crop residues so there is no bare soil, don't overgraze, manage for healthy grass and crops, and, most importantly, manage for healthy soil. While these management practices will not eliminate droughts or floods, they can reduce their impact. ■