



Conservation Systems Research

Improved Water Use and Storage

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Conservation agriculture systems minimize surface soil disturbance and use cover crops to protect the soil surface and increase organic matter in the soil. These practices improve water use efficiency by increasing the amount of water going into the soil and the storage of that water until needed by the crops. Cover crops also reduce water losses through evaporation and transpiration.

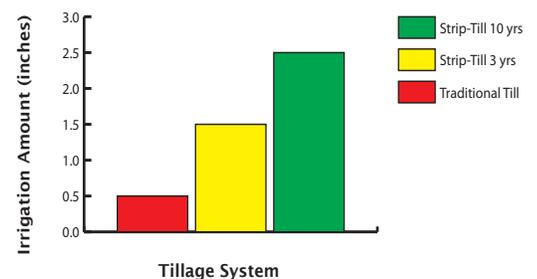
Increased Infiltration

Crop residue on the soil surface protects the soil from crusting. Pores formed by cover crop roots allow rain and irrigation water to move quickly into the soil, reducing or eliminating water runoff and increasing plant-available water in the soil.

Residue on surface reduces (eliminates) runoff.

- More water gets into soil for storage.
- Allows greater irrigation amounts --> less wear on irrigation equipment.
- Reduced soil crust formation.

Maximum Irrigation Amount Without Runoff



Increased Storage

Crop residues and reduced tillage promote greater soil organic matter and porosity. These increase the amount of water that the soil can hold until needed by plants. The amount of additional water that can be stored can often satisfy crops during the short, mid-summer droughts common in the Southeast.

Alabama research ...

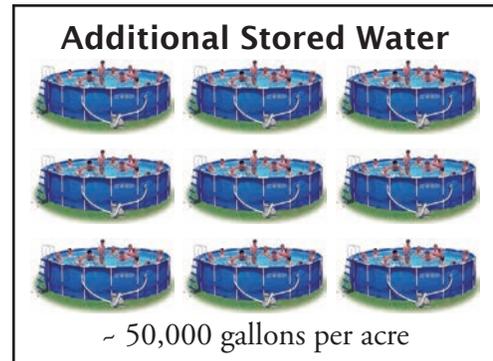
Cotton field with heavy residue had 0.6 inches more water in top 12-inches of soil than cotton field without residue.

≈ 1.5 to 2-inches per three feet depth.

≈ 50,000 gallons per acre.

≈ 5–7 days of additional water for cotton.

- Improved soil structure contains more pores, holds more water.
- Soil organic matter holds 6 times its weight of water.
- 1–3 weeks extra water storage to cover short, mid-summer droughts.



How did the heavy residue result in more water storage?

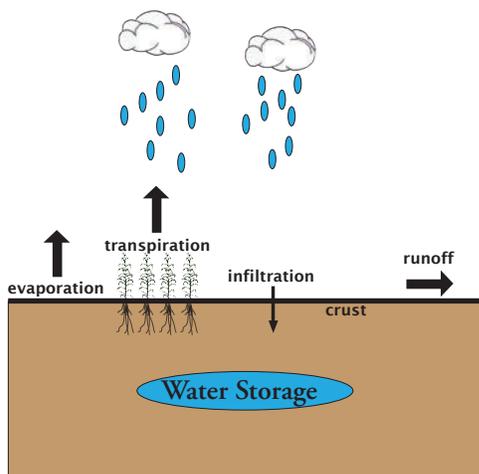
- Root channels increased infiltration.
- Mulch effect reduced crusting.
- Mulch effect reduced evapo-transpiration.

Reduced Water Use

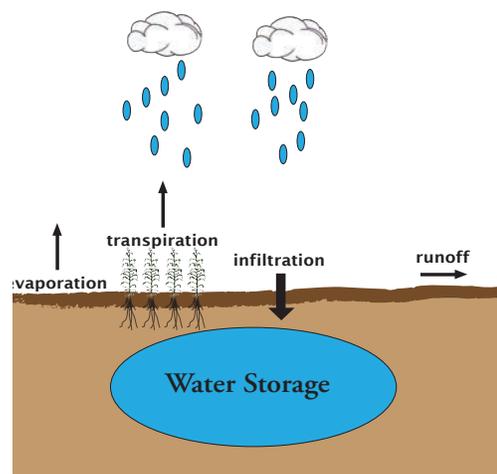
Cover crop residue on the soil surface cools the soil, reducing water evaporation. Cooler soil temperatures also reduce plant leaf temperatures and plant stress, leading to lower transpiration rates through the plants.

Residue cover lowers summer soil temperatures.

- > Less evaporation from the soil.
- > Less transpiration through plants.



No residue cover



Heavy residue cover