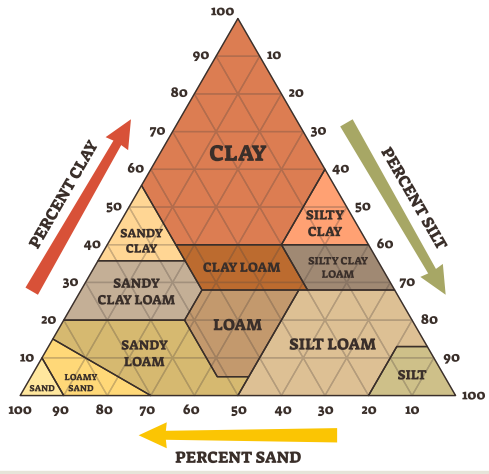
Soil Texture

Soil texture is a crucial component of a soil's water holding capacity (WHC).

- Sandy soils have a low WHC and must be irrigated frequently.
- Clay and silt have high WHC and can be irrigated less frequently.

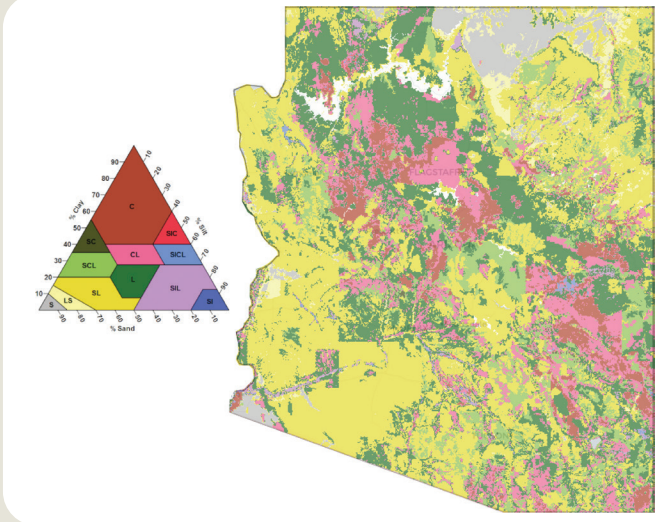
BUT the amount of water a plant can extract from the soil also depends on texture.

- Clay soils may be farmed, but clay holds water so tightly it impedes extraction by plants.
- Silty soils are great for farming as they hold a lot of water available to crops.

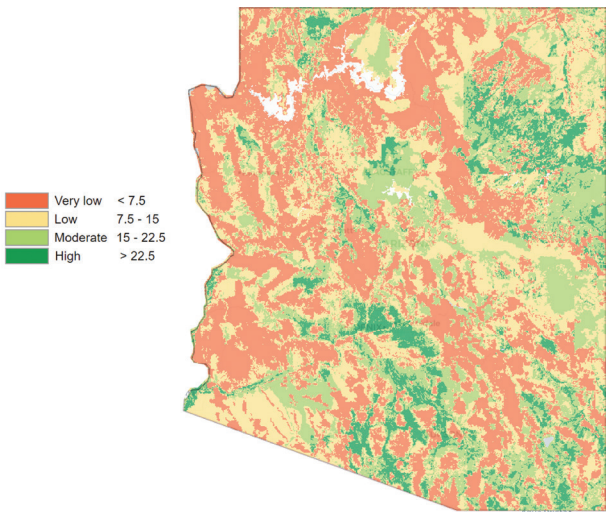


Soil Types

AND higher WHC is not always better. Sandy soils have low WHC but great drainage with little risk of waterlogging.



Soil Texture



Water Holding Capacity (cm)

Soil Organic Matter

- Can hold large volumes of water—much of which is available to crops.
- High SOM can also improve infiltration rates by providing structure to the soil and protecting against crusting and compaction.

Soil Improvement Practices

While soil texture is largely out of farmers' control, soil health can be improved.

Crop Rotation – Alternating crops seasonally or annually

- Balances and cycles nutrients while minimizing risk from pests and disease.
- Diverse root systems improve soil structure and provide soil microbes with different food sources.

Cover Crops – Planted primarily to support soil health rather than crop production

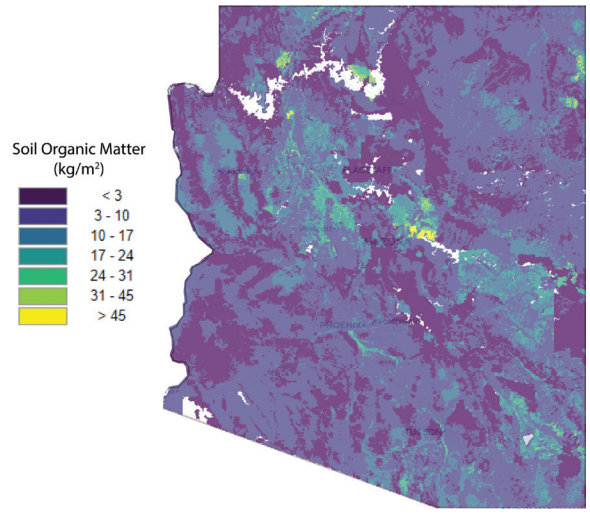
- Used on only ~6% of Arizona's farmland because the year-round growing season encourages planting and irrigating more profitable crops.
- **BUT** cover crops add nitrogen and improve soil health.
- **AND** can control weeds, reducing the need for herbicide.

Conservation tillage – Reducing or eliminating tillage on agricultural fields

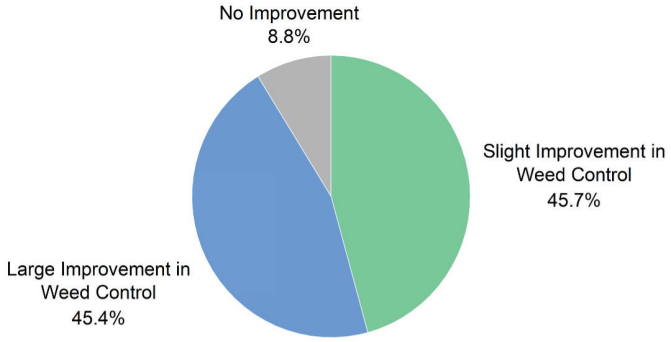
Most of Arizona's farmland is operated under intensive tillage, but between 2012 and 2017, no-till practices increased while intensive tillage decreased by nearly 14%.

Decreased Tillage can:

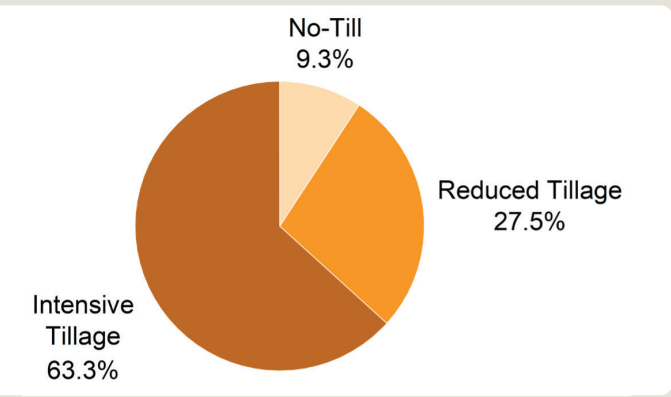
- Save time, money, and fuel;
- Increase SOM, water retention, and drainage;
- Prevent erosion, soil compaction, and CO_2 release;
- Improve yields over the long term.



Soil Organic Matter



US Farmer survey responses on cover crop weed control.



Fraction of acres under intensive, reduced, or no-till practices in Arizona. (2017)