Congreso Aapresid | CON LA FUERZA DE Expoagro | CÓDIGO ABIERTO

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Managing Soil Health in Semi-arid Environments

USDA NIFA

Understanding Semi-Arid Ecosystems

Benefits

Abundant sunshine is available year-round; hot climate often restricts **pest damage**, boosting **crop productivity**

Various crops can be grown in these regions, and a **diversified crop** rotation is possible to target **high market revenues**

Mineral-rich, fertile soils can produce crops even with minimal fertilization, if irrigation is secured

Understanding Semi-Arid Ecosystems

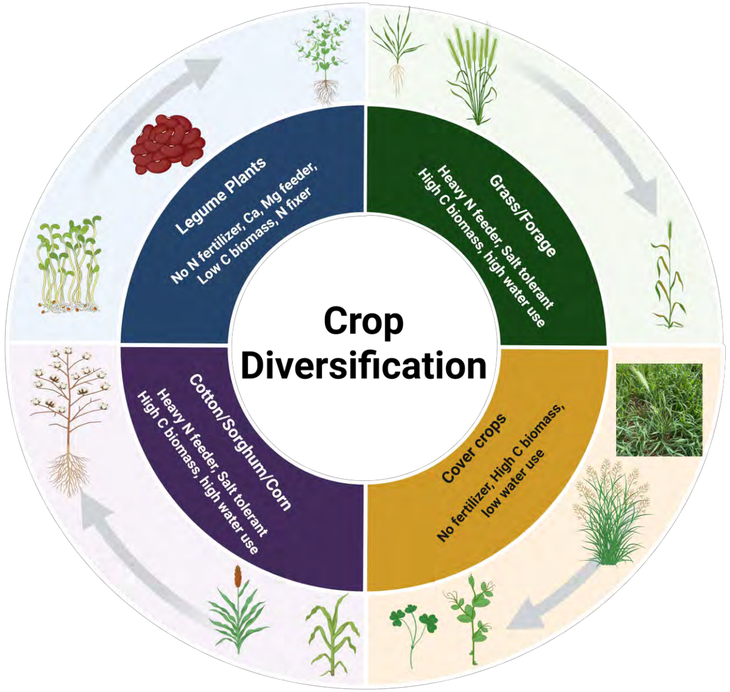
Challenges

Higher temperatures promote **rapid soil organic matter decomposition**, restricting soil organic carbon buildup & aggregation

Salt builds up due to low precipitation and high evapotranspiration.

Decades of **megadrought** have depleted water levels in the reservoirs that provide irrigation water, resulting in **low water budgets**

Soil Health Principles



No tillage is often challenging in semi-arid systems

Seedbed Preparation and Efficient Irrigation

Photo: David M. Kuchta, 2022

Photo: Alyssa Marksz, /Cronkite News, 2021

- Tillage is required to prepare a fine seedbed for small-seeded high-value crops
- To make surface irrigation efficient, furrows should be made to move water rapidly and uniformly in the field; residues are also undesirable as they restrict water movement
- Often, soil crusts should be broken to facilitate seed germination

No tillage is often challenging in semi-arid systems

Weed Management

- Mechanical weed control is necessary for crops grown under organic management
- For high-value crops like leafy vegetables, often herbicides are not available

No tillage is often challenging in semi-arid systems

Lack of necessary machinery/technology, like a no-till planter or roller crimper

No tillage is often challenging in semi-arid systems

Dominant forage crop industry restricts crop residues left in the field as biomass is the sellable product

No tillage is often challenging in semi-arid systems

Incorporation of soil amendments (gypsum, manure) is necessary; surface application is not effective for these products; Tillage is necessary

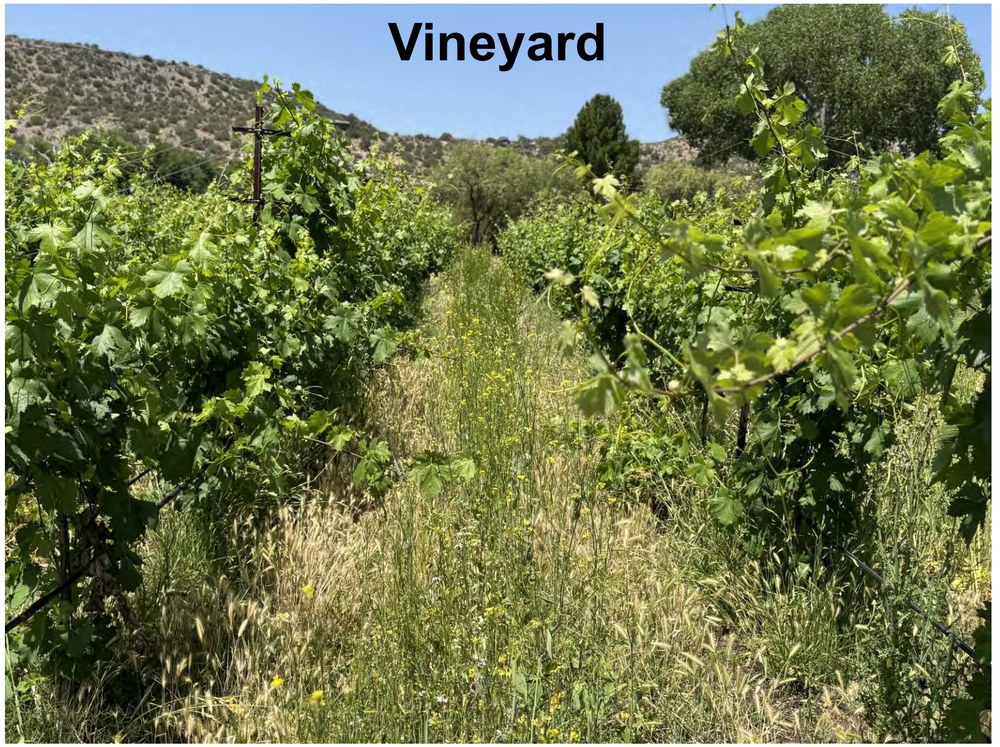
Conservation tillage is more practical in semi-arid systems

Potential Options: Cover crops on Beds

One of the reasons to grow cover crops on beds is to minimize tillage or soil disturbance, and not till the soil before the cotton season; to manage residues while cotton planting, a row-cleaner (Yetter) can be used

Avoiding tillage is the alternative to no tillage

Potential Options: Perennial Crops in Rotation



Growing **perennial crops like alfalfa**, one can avoid tillage and other operations that mechanically disturb soil ecosystems. In **vineyards and pecan orchards**, we can reduce tillage frequency by growing **perennial native cover crops,** which are effective in controlling weeds

Switching irrigation methods is necessary for no-till

Drip and Sprinkler irrigation is the way

Surface irrigation is ineffective with residues on the ground, drip, and sprinkler should be adopted to facilitate residue retention and no tillage

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